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David C. Bender
Earthjustice
3916 Nakoma Road
Madison, WI 53711
Email: dbender@earthjustice.org
Phone: (202) 667-4500

Attorney for Vote Solar

BEFORE THE
ARIZONA CORPORATION COMMISSION

IN THE MATTER OF THE APPLICATION OF ARIZONA PUBLIC SERVICE COMPANY FOR A HEARING TO DETERMINE THE FAIR VALUE OF THE UTILITY PROPERTY OF THE COMPANY FOR RATEMAKING PURPOSES, TO FIX A JUST AND REASONABLE RATE OF RETURN THEREON, TO APPROVE RATE SCHEDULES DESIGNED TO DEVELOP SUCH RETURN	Docket No. E-01345A-19-0236 **NOTICE OF FILING VOTE SOLAR'S DIRECT TESTIMONY**

Pursuant to the Procedural Order issued by the Arizona Corporation Commission on July 31, 2020, Vote Solar, through its undersigned counsel, hereby provides notice that it has this day filed the Direct Testimony of Ronny Sandoval.

DATED this 9th day of October, 2020.

Respectfully submitted,

David C. Bender (pro hac vice)
Staff Attorney

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Staff Attorney
Earthjustice
3916 Nakoma Road
Madison, WI 53711
Email: dbender@earthjustice.org
Phone: (202) 667-4500

Attorney for Vote Solar

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Docket Control
Arizona Corporation Commission
1200 W. Washington,
Phoenix, AZ 85007

I hereby certify that I have this 9th day of October, 2020, served the foregoing document on all parties of record in this proceeding, as listed on the attached service list containing 3 pages, by electronic mailing service.

By: _____
David C. Bender

Adam Stafford
Western Resource Advocates
P.O. Box 30497
Phoenix AZ 85046

stacy@westernresources.org

steve.michel@westernresources.org

autumn.johnson@westernresources.org

adam.stafford@westernresources.org

Consented to Service by Email

Albert H Acken
DICKINSON WRIGHT PLLC
1850 N Central Ave.,
Suite 1400
Phoenix AZ 85004

aacken@dickinson-wright.com

Consented to Service by Email

Armando Nava
The Nava Law Firm PLLC
1641 E Osborn Rd
Ste 8
Phoenix AZ 85016

Filings@navalawaz.com

Consented to Service by Email

Court Rich
Rose Law Group pc
7144 E Stetson Drive
Suite 300
Scottsdale AZ 85251

CRich@RoseLawGroup.com

Consented to Service by Email

Daniel Pozefsky
RUCO
1110 West Washington, Suite 220
Phoenix AZ 85007

jfuentes@azruco.gov

procedural@azruco.gov

rdelafuente@azruco.gov

dpozefsky@azruco.gov

Consented to Service by Email

David Bender
EARTHJUSTICE
1001 G Street, NW, Suite1000
Washington DC 20001

dbender@earthjustice.org

Consented to Service by Email

garry hays
Law office of Garry Hays PC
2198 E Camelback Rd
Suite 230
Phoenix AZ 85016

Ghays@lawgdh.com

Consented to Service by Email

Giancarlo Estrada
KAMPER ESTRADA, LLP
3030 N. 3rd Street, Suite 770
Phoenix AZ 85012

gestrada@lawphx.com

Consented to Service by Email

Greg Patterson
Munger Chadwick/Competitive Power Alliance
5511 S. Jolly Roger
Tempe AZ 85283

Greg@azcpa.org

Consented to Service by Email

Gregory M. Adams
515 N. 27th St.
Boise ID 83702

greg@richardsonadams.com

greg.bass@calpinesolutions.com

Consented to Service by Email

Holly L. Buchanan
139 Barnes Dr., Suite 1
Tyndall AFB FL 32403

Holly.buchanan.1@us.af.mil

Consented to Service by Email

Jason Y. Moyes
Moyes Sellers & Hendricks
1850 N. Central Ave., Ste. 1100
Phoenix AZ 85004

jim@harcuvar.com

jasonmoyes@law-msh.com

jjw@krsaline.com

Consented to Service by Email

Jason R. Mullis
WOOD SMITH BENNING & BERMAN LLP
2525 E. Camelback Road, Ste. 450
Phoenix AZ 85016

greg@richardsonadams.com

jmullis@wshblaw.com

greg.bass@calpinesolutions.com

Consented to Service by Email

John B. Coffman
JOHN B. COFFMAN LLC
871 Tuxedo Blvd.
St. Louis MO 63119

john@johncoffman.net

Consented to Service by Email

John S. Thornton
8008 N. Invergordon Rd.
Paradise Valley AZ 85253

john@thorntonfinancial.org

Consented to Service by Email

Jonathan Jones
14324 N 160th Dr
Surprise AZ 85379

jones.2792@gmail.com

Consented to Service by Email

Karen S White
AFIMSC/JAQ
139 Barnes Ave
Tyndall AFB FL 32403

karen.white.13@us.af.mil

Consented to Service by Email

Kimberly A. Dutcher
NAVAJO NATION DEPARTMENT OF JUSTICE
P.O. Box 2010
Window Rock AZ 86515

kdutcher@nndoj.org

aquinn@nndoj.org

Consented to Service by Email

Kurt J. Boehm
Boehm, Kurtz & Lowry
36 E. Seventh St. Suite 1510
Cincinnati OH 45202

jkylercohn@BKLlawfirm.com

kboehm@bkllawfirm.com

Consented to Service by Email

MAJ Scott L Kirk
AFLOA/JACE-ULFSC
139 Barnes Dr., Suite 1
Tyndall AFB FL 32403-5317

scott.kirk.2@us.af.mil

Consented to Service by Email

Marta Darby
Earthjustuce
633 17th Street
Suite 1600
Denver CO 8020280202

mdarby@earthjustice.org

Consented to Service by Email

Melissa M. Krueger
Pinnacle West Capital Corporation
400 North 5th Street, MS 8695
Phoenix AZ 85004

Andrew.Schroeder@aps.com

rodney.ross@aps.com

Thomas.Mumaw@pinnaclewest.com

Theresa.Dwyer@pinnaclewest.com

ratecase@aps.com

Leland.Snook@aps.com

Melissa.Krueger@pinnaclewest.com

Consented to Service by Email

Nicholas J. Enoch
LUBIN & ENOCH, PC
349 N. Fourth Ave.
Phoenix AZ 85003

bruce@lubinandenoch.com

clara@lubinandenoch.com

nick@lubinandenoch.com

Consented to Service by Email

Patricia Madison
13345 W. Evans Drive
Surprise AZ 85379

Patricia_57@q.com

Consented to Service by Email

Patrick J. Black
FENNEMORE CRAIG, P.C.
2394 E. Camelback Rd. Suite 600
Phoenix AZ 85016

lferrigni@fclaw.com

pblack@fclaw.com

Consented to Service by Email

Richard Gayer
526 W. Wilshire Dr.
Phoenix AZ 85003

rgayer@cox.net

Consented to Service by Email

Robert A Miller
12817 W. Ballad Drive
Sun City West AZ 853785375

rdjscw@gmail.com

Bob.miller@porascw.org

Consented to Service by Email

Robin Mitchell
Arizona Corporation Commission
Director & Chief Counsel - Legal Division
1200 West Washington St.
Phoenix AZ 85007

legaldiv@azcc.gov

utildivservicebyemail@azcc.gov

Consented to Service by Email

Scott S. Wakefield
HIENTON CURRY, P.L.L.C.
5045 N 12th Street, Suite 110
Phoenix AZ 85014-3302

Stephen.Chriss@walmart.com

swakefield@hclawgroup.com

Consented to Service by Email

Shelly A. Kaner
8831 W. Athens St.
Peoria AZ 85382

Thomas Harris
Distributed Energy Resource Association (DERA)
5215 E. Orchid Ln
Paradise Valley AZ 85253

Thomas.Harris@DERA-AZ.org

Consented to Service by Email

Thomas A. Jernigan
AFIMSC/JAU
139 Barnes Drive, Suite 1
Tyndall AFB FL 32403-5317

thomas.jernigan.3@us.af.mil

Consented to Service by Email

Timothy M. Hogan
ARIZONA CENTER FOR LAW IN THE PUBLIC INTEREST
514 W. Roosevelt St.
Phoenix AZ 85003

louisa.eberle@sierraclub.org

miriam.raffel-smith@sierraclub.org

rose.monahan@sierraclub.org

cpotter@swenergy.org

czwick@wildfireaz.org

briana@votesolar.org

brendon@gabelassociates.com

Sandy.bahr@sierraclub.org

ezuckerman@swenergy.org

janderson@aclpi.org

sbatten@aclpi.org

thogan@aclpi.org

Consented to Service by Email

BEFORE THE ARIZONA CORPORATION COMMISSION

IN THE MATTER OF THE APPLICATION OF ARIZONA PUBLIC SERVICE COMPANY FOR A HEARING TO DETERMINE THE FAIR VALUE OF THE UTILITY PROPERTY OF THE COMPANY FOR RATEMAKING PURPOSES, TO FIX A JUST AND REASONABLE RATE OF RETURN THEREON, TO APPROVE RATE SCHEDULES DESIGNED TO DEVELOP SUCH RETURN	)	Docket No. E-01345A-19-0236

DIRECT TESTIMONY OF RONNY SANDOVAL

ON BEHALF OF
VOTE SOLAR

October 9, 2020

TABLE OF CONTENTS

LIST OF EXHIBITS

I. INTRODUCTION AND WITNESS QUALIFICATIONS

Q. Please state your name and qualifications.

A. My name is Ronny Sandoval. I am a Regulatory Director for Vote Solar - leading the organization's efforts to transform the electric system and maximize opportunities for sustainable energy in the Interior West.

Vote Solar is an independent 501(c)(3) nonprofit working to repower the U.S. with clean energy by making solar power more accessible and affordable through effective policy advocacy. Vote Solar seeks to promote the development of solar at every scale, from distributed rooftop solar to large utility-scale plants. Vote Solar has over 90,000 members nationally, including over 9,000 members in Arizona. Vote Solar is not a trade organization nor does it have corporate members.

Q. On whose behalf are you testifying in this proceeding?

A. I am testifying on behalf of Vote Solar.

Q. Please provide your educational background.

A. I hold a Bachelor of Science degree in Mathematics from New York University, a Bachelor of Engineering in Electrical Engineering from Stevens Institute of Technology, and a Master of Business Administration from New York University.

Q. Please describe your work and professional experience.

A. I have over ten years of management experience in the utility business, including in areas of transmission and distribution system planning that involved performing technical studies and developing capital system reinforcement plans needed to serve customers' growing demand for electricity. As part of my roles in the demand-side management departments, I also managed efforts to increase energy efficiency and reduce peak

electricity use in capacity constrained areas of the system and forecasted the long-range impacts of energy efficiency programs for system and capital planning.

In my more recent roles in non-profit advocacy, I developed strategies to modernize and increase the efficiency of the electric grid through cost-effective system investments, greater adoption of intelligent system operations, and transparency through metric reporting and stakeholder engagement.

I also sit on the boards of GridWise Alliance and Interstate Renewable Energy Council. GridWise Alliance is an organization that champions the transformation of the electric grid. It leverages its diverse membership to support key decision makers by developing strategies, action plans, best practices, education, outreach and more. The Interstate Renewable Energy Council is a non-profit organization that focuses on building the foundation for a clean energy economy by providing leadership and expertise across areas of regulatory reform, workforce development, and customer empowerment.

My educational background and work experience are summarized in my CV, Exhibit VS-1 to my testimony.

Q. Have you previously filed expert testimony in a proceeding before the Arizona Corporation Commission or any other regulatory agency?

A. I have not previously testified at the Arizona Corporation Commission ("Commission"). However, I have previously testified in utility proceedings before regulatory commissions in other states, including the following cases:

- Puerto Rico Public Service Regulatory Board, Case No. CEPR-AP-2018-0001, Review of the Puerto Rico Electric Power Authority Integrated Resource Plan;

- Indiana Utility Regulatory Commission, Cause No. 45264, Verified Petition of Indianapolis Power & Light Company for Approval of IPL's TDSIC Plan for Eligible Transmission, Distribution, and Storage System Improvements;
- New Jersey Board of Public Utilities, Docket No. ER16060524, In the Matter of Rockland Electric Company for Approval of an Advanced Metering Program; and for Other Relief;
- Indiana Utility Regulatory Commission, Cause No. 44720, Duke Energy Indiana, Inc.'s verified petition for approval of its 7-year plan for eligible Transmission, Distribution, and Storage System Improvements;
- Michigan Public Service Commission, Case No. U-20697, In the Matter of the application of Consumers Energy Company for authority to increase its rates for the generation and distribution of electricity and for other relief.

Q. Are you providing any exhibits to your testimony?

A. Yes, I am sponsoring the following exhibits:

- Exhibit VS-1: CV of Ronny Sandoval
- Exhibit VS-2: Compiled Responses to Data Requests

II. PURPOSE OF TESTIMONY

Q. What is the purpose of your direct testimony?

A. The purpose of my direct testimony is to provide recommendations on the Arizona Public Service Company's ("Company" or "APS") approach to valuing and compensating customer energy exports, the Company's performance metric and formula rate concepts, and the Company's proposed rates for utility service to customers with distributed energy resources ("DERs").

Q. How is your testimony organized?

A. First, I provide an overview of the methodologies for valuing and compensating rooftop solar exports and provide recommendations (Section III). Then, I react to the Company's discussion of the formula rate concept and proposal for a performance metric reporting

requirement (Section IV). Finally, I describe the lack of a sufficient basis for imposing a grid access charge and for not applying the same demand limiting billing determinant for customers with DERs like solar in tariffs (Section V).

III. METHODOLOGIES FOR VALUING AND COMPENSATING ROOFTOP SOLAR EXPORTS

Q. Please describe the methodologies for valuing rooftop solar exports discussed in this case.

A. Beginning in 2013, the Commission undertook an investigation into net metering issues and in January 2014, opened generic docket E-00000J-14-0023.[1] That generic proceeding, which set out to investigate the value and costs associated with distributed generation, culminated in a Commission decision in early 2017 that adopted two methodologies for calculating the value of distributed generation ("DG") exports. The adopted methodologies were originally proposed by Staff and are referred to as the "Resource Comparison Proxy" and the "Avoided Cost Methodology."

Q. Please describe the Resource Comparison Proxy Methodology.

A. The Company summarizes the Resource Comparison Proxy ("RCP") Methodology as one that determines the value of rooftop solar exports using "prices paid for utility-scale solar energy projects going into service in a historical five-year window, adjusted for losses and transmission and distribution savings."[2] According to the Commission's Decision No. 75859, "[t]he reduction to the compensation rate under the RCP

[1] Commission Decision No. 75859, at 3, Docket No. E-00000J-14-0023 (Jan. 3, 2017) ("Decision No. 75859").
[2] Direct Test. of Brad J. Albert on behalf of Company, at 15:11–13 (Oct. 31, 2019) ("Albert Direct").

methodology shall not exceed 10 percent annually."[3] Those annual "tranches" determine for the customer the value of bill credits of exports for ten years.

Q. What is the Company's proposal with respect to the RCP in this case?

A. The Company indicates its intent to follow the RCP methodology based on the "solar projects that went into service during the five-year historical period of 2014 to 2018,"[4] which produced a proposed levelized value of $0.06869/kWh including an adjustment for line losses. However, because the RCP value for the 2018 tranche was $0.11610/kWh[5] and the Commission's Decision No. 75859 limits annual decreases to 10%, the Company proposed a 201920 value of exports at $0.10450/kWh with 10% annual reductions thereafter. The Company states that it supports the "continued use of the RCP with annual updates"[6] at this time.

Q. Has the Commission made any other decisions related to the RCP since Decision No. 75859?

A. Yes. In Decision No. 77760,[7] the Commission issued an Order to extend APS's current RCP for an additional year (until October 1, 2021). Therefore, the RCP value will not decrease by 10% this year as APS's application in this case presumed.

Q. Please describe the Company's proposed Avoided Cost Methodology.

A. The Company describes the avoided cost methodology as "established by the Commission to determine the value of residential rooftop solar energy exported to the

[3] Decision No. 75859 at 148:15–16.
[4] Albert Direct at 16:15–16.
[5] Application at Attachment A, In the Matter of the Application of Arizona Public Service Company for Approval of its Fourth Revised Rate Rider RCP, Docket No. E-01345A-20-0113 (May 1, 2020).
[6] Albert Direct at 19:3–4.
[7] Commission Decision No. 77760, Docket No. E-01345A-20-0113 (Oct. 2, 2020).

grid. It is a forecast of costs the utility would have paid to serve load in the absence of the exported energy."[8]

The Company further purports to summarize[9] principles introduced in Decision No. 75859 as:

- Utilize a five-year forecast of avoided costs;
- Avoided costs include energy savings;
- Utilize an Effective Load Carrying Capability ("ELCC") assessment to identify and analyze the costs and capacity savings from generation, transmission and distribution resulting from rooftop solar exports; and
- Include the impact of generation, transmission, and distribution losses.

Q. Did the Commission provide additional guidance on the evaluation of costs and benefits as part of an Avoided Cost Methodology?

A. Yes, the Commission's decision offered further direction on the development of an Avoided Cost Methodology, notably "[f]or the Avoided Cost Methodology with Five-Year Forecasting, Staff shall use the matrix attached to this Decision as Exhibit A to evaluate specific eligible costs and value of energy, capacity, and other services delivered to the grid by DG (of all types) over a five-year horizon, during each electric utility's rate case, in order to inform a determination on an appropriate level of compensation to be paid to DG customers for their exports to the grid."[10] The "matrix" described was reproduced from an Exhibit found in Staff's Direct Testimony[11] in the value and cost of

[8] Albert Direct at 15:21–23.
[9] *Id.* at 17:7–15.
[10] Decision No. 75859 at 153:7–11.
[11] Direct Testimony of Howard Solganick for the Utilities Division, at Exhibit HS-3, Docket No. E-00000J-14-0023 (Feb. 25, 2016).

distributed generation investigation. That matrix includes a listing of potential value streams that distributed generation provides across the various segments of the electric system. The Company's proposed Avoided Cost Methodology includes many of the value categories included in the matrix approved by the Commission to guide the evaluation of DG costs and benefits, but not all. Value categories such as "carbon" and "market price response" reflected in the guidance matrix should be recognized and accounted for, especially if their full value is not reflected as part of other benefit streams.

Q. How does the Company propose to quantify distribution loss value?

A. The Company asserts that distribution losses are comprised of losses through "Service drop and service entrance; Distribution transformer; Distribution feeder line; and Distribution substation transformer," but argues that "[w]hen residential rooftop solar is exported to the grid, it generally has to travel across the first three elements before it is delivered to other customers, and incurs losses. Therefore, residential rooftop solar exports only avoid the distribution substation transformer losses."[12] It is unclear what the Company means by "generally" in this statement. However, in quantifying distribution losses, the Company should be required to conduct load flow and other appropriate studies to quantify the expected loss reduction impact of DERs and ensure loss reductions across all appropriate distribution system segments are accounted for.

[12] Company Response to Solar Energy Industries Association's ("SEIA") First Set of Data Requests, 1.14(b) (Jan. 21, 2020) (Exhibit VS-2).

Q. Did the Commission set a deadline for implementing a model for the Avoided Cost Methodology?

A. Yes. The Commission modified Decision Nos. 75849 and 77554 "to extend the deadline for Staff to implement an electronic spreadsheet for the Avoided Cost Methodology with Five-Year Forecasting until December 31, 2020."[13]

Q. What is the Company's proposal with respect to the Avoided Cost Methodology in this case?

A. The Company notes that the methodology has not been finalized, but "is asking the Commission to approve the methodology for potential use in future APS rate cases."[14]

Q. What do you recommend regarding the Company's proposed Avoided Cost Methodology?

A. The Commission should reject the company's methodology because it omits several value categories.

The Company's Avoided Cost Methodology includes a placeholder for avoided transmission capacity, avoided distribution capacity, and metering and customer costs where it did not, or could not, provide a value at this time. Specifically, regarding the latter category, the Company has indicated that it "has no specific intent to update this methodology in the future but is allowing for the possibility of updating it."[15]

The Company's proposal omits values based on the Company's inability to easily quantify the value. That "default to zero" prejudices customer-owned solar to the benefit of the Company. Though some values may be more difficult to quantify or monetize

[13] Commission Decision No. 77654, at 4:2–4, Docket No. E-00000J-14-0023 (June 30, 2020).
[14] Albert Direct at 17:5–6.
[15] Company Response to Vote Solar's First Set of Data Requests, at 1.11(f) (June 22, 2020) (Exhibit VS-2).

today that does not mean that they have no value. It is important that a value be applied based on the best information available and that these benefit streams continue to be examined going forward. Our ability to quantify these benefit streams may change over time, but it is important that we continue to recognize their value and investigate ways to accurately reflect these values as DG capabilities evolve and changes are implemented to the system.

For example, the Company did not provide values for transmission and distribution costs because, it claims, it had "not identified projects that can avoid transmission or distribution upgrades."[16] The Company should provide a proposed approach for identifying potential transmission and distribution deferrals, in addition to its approach for determining the value of such deferrals once identified.

Q. Please describe how a utility might estimate avoided long-term capacity costs as a result of DER.

A. The Company can use a combination of methods to estimate long-term distribution system marginal costs, or deferral value, which can be translated into avoided cost benefits from DER. This might include marginal cost of service studies, regression methods, or benchmarking. A marginal cost of service study is often used to inform rate making and identifies the investments needed for serving additional load. These studies are used to inform DER valuation in some jurisdictions, such as in New York, where marginal costs are used in calculating DER avoided cost benefits over the long term. Regression methods, which are sometimes used in rate making, reflect the process of

[16] Company Response to Commission Staff's Ninth Set of Data Requests, at 9.22(d) (Apr. 10, 2020) (Exhibit VS-2).

estimating marginal distribution costs based on a combination of historical and future distribution investment data, as compared against load or capacity as an independent variable. Benchmarking is an approach in which the Company can rely on long-term avoided distribution cost estimates from other jurisdictions. While this is an approximation, benchmarking can be performed with utilities having similar service territory characteristics.

Q. Are there any other values that DER can provide to the distribution grid that you would like to cover?

A. Resilience can be defined as "the ability to anticipate, prepare for, and adapt to changing conditions and withstand, respond to, and recover rapidly from disruptions through adaptable and holistic planning and technical solutions."[17] Resilience differs from reliability in that it focuses more closely on the impact to people as opposed to the performance of the system.

Q. How might a utility quantify these values?

A. The value of avoiding lengthy and or frequent disruptions has often been approximated using Value of Loss Load ("VOLL") calculations. This analysis essentially estimates economic losses based on a number of factors, including length of outage and customer type. Through this approach, commercial customers often receive a high VOLL in estimating damages due to outages, while residential customers often receive estimate orders of lower magnitude. This approach is common in assessing disruptions associated with events that impact reliability.

[17] Nat'l Renewable Energy Lab., *Resilience Roadmap, A Collaborative Approach to Multi-Jurisdictional Planning* (June 2019), https://www.nrel.gov/resilience-planning-roadmap/.

As resilience centers around events that pose a large shock to a system and imposes significant burden on people, value streams can recognize this hardship and the value of critical facilities to maintain continuity of service.

Table 2. Examples of Consequence Categories for Consideration in Grid Resilience Metric Development

Consequence Category	Resilience Metric
Direct	
Electrical Service	Cumulative customer-hours of outages Cumulative customer energy demand not served Average number (or percentage) of customers experiencing outage during a specified time period
Critical Electrical Service	Cumulative critical customer-hours of outages Critical customer energy demand not served Average number (or percentage) of critical loads that experience an outage
Restoration	Time to recovery Cost of recovery
Monetary	Loss of utility revenue Cost of grid damages (e.g. repair or replace lines, transformers) Cost of recovery Avoided outage cost
Indirect	
Community Function	Critical services without power (e.g., hospitals, fire stations, police stations) Critical services without power for more than N hours (e.g., N > hours of back up fuel requirement)

[18]

I recommend that the Company continue to include the entire list of value streams recognized in the Commission's guidance that is applicable to exported energy from rooftop solar in its Avoided Cost Methodology. The Company should continue to explore methods of refining the data sets and calculations that may provide more accurate and actionable signals.

[18] Sandia Nat'l Labs., *Resilience Metrics for the Electric Power System: A Performance-Based Approach*, at 19–20 (Feb. 2017), https://prod-ng.sandia.gov/techlib-noauth/access-control.cgi/2017/171493.pdf.

IV. FORMULA RATE CONCEPT AND PERFORMANCE METRICS

Q. How does the Company present its Formula Rate concept?

A. The Company presents the Formula Rate concept as one that "provides incremental annual adjustments to rates, based on agreed upon, Commission-approved inputs to a formula that are established during a rate case. With the agreed upon structure in place, inputs are updated and reviewed annually and rates are adjusted accordingly."[19] The Company also states that "a formula rate would further improve rate gradualism, decrease regulatory lag, and potentially increase the amount of time between rate cases."[20]

Q. How would one measure Company performance under the Formula Rate concept?

A. The Company proposes "performance metrics related to reliability and customer satisfaction incorporated into the formula rate concept."[21] The Company also offers that "the performance metric reporting requirement would be a compliance filing process in parallel with the formula rate update, with differing levels of compliance information for different levels of performance."[22]

Q. Is the Company presenting a proposal on Formula Rates in this filing?

A. No, the Company states it is presenting the Formula Rate concept as an alternative to adjustor mechanisms since "there has been discussion in a number of regulatory proceedings about the pros and cons of adjustor mechanisms."[23]

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[19] Direct Testimony of Leland R. Snook on Behalf of Company, at 22:20–23 (Oct. 31, 2019).
[20] *Id.* at 23:2–4.
[21] *Id.* at 23:12–13.
[22] *Id.* at 23:16–19.
[23] *Id.* at 24:6–8.

Q. What do you recommend as design considerations and safeguards with respect to reporting and evaluation?

A. Though the APS's exploration of the Formula Rate concept is not yet at the proposal stage, the Company should begin to work with stakeholders to investigate the potential applications, necessary safeguards, and appropriate performance metrics that could address stakeholder interest and concerns. The National Regulatory Research Institute ("NRRI") recognized[24] "additional reporting and monitoring requirements" and "less scrutiny of utility costs" as potential areas of concern when deploying formula rates with the intent of advancing regulatory objectives.

Beyond the performance metrics presented by the Company, stakeholders should consider a broad range of objectives that could be incentivized by such a concept. However, these metrics need to be very well designed to ensure they are truly reflective of utility performance. This may mean spending time on the front end, designing and collecting data on metric categories before they are actually used to offer some form of performance incentives. As such, the Company should begin to explore these performance metrics alongside the investigation into the appropriate application of this concept with stakeholders.

A summary of some potential metrics is presented below:

[24] NRRI, *Alternative Rate Mechanisms and Their Compatibility with State Utility Commission Objectives*, at 53 (Apr. 2014), https://pubs.naruc.org/pub/FA86C519-AF31-D926-BE12-2AC7AE0CD8D6.

Benefit Category	Metric	Units of Measurement
Resiliency	Cumulative daily power outages	Customer-days without power
Resiliency	Repair and recovery costs bore by the utility	$ (dollars)
Resiliency	Emergency service assets without power for more than 48 hours	# of assets
Customer Engagement	Mean-time to DER interconnection by customer class	# of days per class
Customer Engagement	Customer awareness of energy efficiency, demand management, and distributed generation options and programs.	Awareness surveys to be conducted, including the development of a baseline for measuring progress.
Customer Engagement	Access to Hosting Capacity Mapping Information	% of system with hosting capacity maps availability

V. GRID ACCESS CHARGE AND COST OF SERVICE

Q. Has the Company provided a strong basis for its Grid Access Charge imposed on customers with distributed generation?

A. No. The Company cites a negotiated Grid Access Charge Value from a stipulated settlement[25] in its prior rate case and a general characterization of DG customers as "partial requirements"[26] customers as the basis and justification for imposing additional charges on customers with distributed generation (like rooftop solar customers). The load and cost data do not support imposing additional charges on distributed generation customers. Those customers receive the same service as customers without distributed generation and return their costs to a similar degree as customers without distributed generation and similar loads and usage patterns do. It is my understanding that part of

[25] Company Response to SEIA's Fourth Set of Data Requests, 4.5(a) (Feb. 24, 2020) (Exhibit VS-2).
[26] Company Response to SEIA's Eleventh Set of Data Requests, 11.1(a) (Mar. 9, 2020) (Exhibit VS-2).

the Company's justification for charging distributed generation customers differently relies on the results produced by its Cost of Service Study, purportedly showing lower cost recovery and returns from distributed generation customers. I address this issue below. It is my understanding that additional witnesses will be addressing these issues and I reserve the ability to respond to those witnesses.

- **Metering**

Q. Are there any problems with the Company's Cost of Service Study related to metering costs allocated to distributed generation customers?

A. Yes. It allocates the cost of a second meter to distributed generation customers that is not required to provide service to those customers and which results in overstating metering costs. Most utilities use Advanced Metering Infrastructure ("AMI")—also called "smart meters"—to provide service to customers with distributed generation. Even those that rely on less modern electromechanical meters typically do not require a second meter for customers with distributed generation.

In addition to the AMI capable of bidirectional metering, APS installs a second meter to measure production from the solar array which is not required for the customer to receive service from APS.[27] Instead, the additional production meter is only required because of APS's 2012 Renewable Energy Standard Tariff ("REST") Implementation plan.[28] In fact, the costs of the production meter have been collected since 2006 through the REST rider, confirming that they are a REST compliance cost not a cost to provide

[27] Company Response to SEIA's Seventh Set of Data Requests, 7.1(a), (b) (Feb. 24, 2020) (Exhibit VS-2).
[28] Commission Decision No. 72737, at 9:13–16, Docket No. E-01345A-11-0264 (Jan. 18, 2012).

service to solar customers.[29] Assigning the cost of the production meters to solar customers in its Cost of Service analysis falsely inflates the cost to serve DG customers in APS's Cost of Service analysis.

Q. Has the Commission previously ruled on this issue?

A. Yes. In addition to including the cost of the production meter in the REST rider—clearly reflecting the Commission's understanding that it is a compliance costs for the REST program, itself—the Commission explicitly rejected allocating the costs of production meters to solar customers in the Tucson Electric Power Company ("TEP") rate case. The Commission determined that solar customers should only be responsible for the "incremental cost of a bidirectional meter that is necessary for DG customers to receive credit for their systems' production and to receive compensation for their excess production."[30] The Commission has determined that solar customers are not responsible for the production meter as it

> supports REST compliance (and [Lost Fixed Cost Recovery] LFCR calculations). The REST Rules are for the benefit of all ratepayers, the Company, and society in general, and the cost of REST compliance should not be imposed only on the group of customers who contribute to meeting renewable goals. The bidirectional meters, however, do benefit the DG customers who receive compensation for their production, and it is appropriate on an interim basis that new DG customers are responsible for the additional costs of serving them.[31]

[29] *See* Commission Decision No. 69127, Docket No. RE-00000C-05-0030 (Nov. 14, 2006).
[30] Commission Decision No. 75975, at 155, Docket No. E-01933A-15-0239 (Feb. 24, 2017).
[31] *Id.*

- **Distribution Demand Costs Allocation**

Q. Are there any problems with how APS allocates distribution demand costs to DG customers?

A. Yes. APS allocates distribution demand costs to DG customers based on their loads in an hour that does not reflect peak loading on the distribution equipment and has no relationship to cost causation. APS allocates primary distribution costs to the non-coincident peak demand ("NCP") and secondary distribution demand cost to the sum of individual maximum demands ("SIMD"). However, it defines the NCP hour as the sub-class NCP hour, rather than the residential class-wide NCP hour. That is, it effectively assumes that solar customers are receiving distribution service from a separate distribution system as non-solar customers and that the solar-specific peaks are driving the demand costs of the solar-specific distribution system. This is an assumption the Commission previously rejected in the TEP case. I note that this is separate and in addition to APS's error by allocating costs to site load and then only partially crediting back the difference between the site load and the actual APS served load.

Q. What is the basis for using an NCP allocator for distribution demand costs?

A. The historic rationale for allocating distribution substation and primary distribution line costs based on class NCP is that there is less load diversity among customers served at the distribution level than the system level and the class NCP better reflects the peak loading on distribution equipment serving customers in that class than the class contribution to system peak. The underlying assumptions are that customers within a large class (e.g., residential customers) tend to be co-located on the distribution system, substations and primary circuits therefore serve predominantly one type of customer

class, and that a customer class's NCP reflects the peak loads on the equipment serving predominantly that class.

Q. What is the problem with using a solar-customer specific NCP hour?

A. Whether or not the historical assumption used to justify using an NCP allocator for distribution demand costs I just noted are true for class-wide loads, they are clearly not true for subclass NCPs as APS has done. Primary distribution system equipment serves hundreds to thousands[32] of customers from "a mix of rate classes"[33] and peak loading on equipment like substations is the result of cumulative contributions during a single peak hour. Peak loading on a single substation does not occur multiple different times for each individual subclass served by it. A relatively small subgroup—like solar customers—is disbursed across the various substations and feeders. The number of residential solar customers on any particular substation or feeder is nominal compared to the number of non-solar customers on that equipment.[34] Therefore, solar customer's peak load hour will not dictate the peak loading on the substations and feeders serving them. Instead, the peak loading will be driven by the larger classes being served and dispersed solar customers will contribute to those cumulative peak loads based on their contribution during the class-wide peak load hour.

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[32] According to SEIA 5.1, a substation serves an average of 3,322 residential customers and a primary line serves an average of 940 residential customers. Company Response to SEIA's Fifth Set of Data Requests, at 5.1 (Feb. 6, 2020) (Exhibit VS-2).

[33] Company Response to SEIA's Fourth Set of Data Requests, at 4.7(b) (Jan. 4, 2020) (Exhibit VS-2).

[34] Of the substations that serve residential solar customers, one substation of more than 300 shows 40% of customers served as residential solar customers, a handful have 15–20%, and the vast majority show percentages in the single digits. *See* Company Response to Vote Solar's Third Set of Data Requests, at 3.3, VS 3.3_ExcelAPS19RC01593_DG_and_customer_counts_at_Substation, *Customers interconnected by APS substations as of June 30, 2019* (July 17, 2020) (percent of Total Residential Installations in column B divided by Total Meter Count in column E).

In fact, APS admits, "distribution assets are built to serve the areas of the grid that they serve" and not particular classes.[35] That is correct, and calls into question the use of class NCP rather than cumulative peaks in specific areas served by distribution equipment generally. But, even if NCP reflected those peaks for the residential class as a whole, it certainly does not support using subclass specific NCP hours that have no relationship to the peak loads on the "areas of the grid they serve."

Q. Has the Commission previously ruled on this issue?

A. Yes. In Phase 2 of the TEP rate case, the Commission determined in Decision 76899 that the utility should not allocate costs based on a solar-specific NCP but, instead, only based on solar customer's net contribution to the class-wide NCP load.

> The Companies utilized the class NCP method, which determined the NCP for the non-DG and DG classes separately, to allocate the distribution costs between DG and non-DG customers. However, usage of the grid during times other than the net combined NCP of the DG and non-DG classes should not be factored into the allocation of the distribution costs as it does not drive distribution capacity costs... Because the net combined residential NCP occurs in July, this is the basis for allocating the distribution circuit courts, and it is irrelevant that the DG customers' NCP occurs in April because the circuit must be built to serve the maximum total residential capacity which occurs in July. No additional cost is incurred to serve the DG customers' NCP... [U]se of the class NCP method [I.e., separate NCP hours for solar and non-solar] can yield very different results from the more equitable net combined Residential NCP method... [U]se of the separate class NCP demands instead of the relative demands each class places on the distribution system at the time of their combined maximum demand, does not attribute the cost of the distribution system in proportion to cost causation between the DG and non-DG classes, and thus, it is inequitable.[36]

[35] Company Supplemental Response to SEIA's Ninth Set of Data Requests, at 9.7(a) (Feb. 19, 2020) (Exhibit VS-2).
[36] Commission Decision No. 76899, at 94–96, Docket No. E-01933A-15-0239 (Sept. 20, 2018).

- **Grid Access Charge**

Q. Does the Company's Cost of Service Study Results support its proposed Grid Access Charge for distributed generation customers?

A. No. As I note above, the Grid Access Charge is based on a settlement and is not tied to anything in particular in the Cost of Service Study. To the extent that the Company relies on a purported undercollection of costs to support the Grid Access Charge, the Cost of Service Study contains numerous problems that overstate costs and understate revenues from DG customers. I note several of those flaws here and I understand other parties will provide additional testimony on those flaws. Under a correct cost of service and revenue analysis, DG customers return their costs to the same extent as other customers with similar load without the Grid Access Charge. Therefore, the cost of service results cannot support the Grid Access Charge.

VI. CONCLUSION

Q. Please summarize your recommendations.

A. The Company should continue to include the entire list of value stream recognized in the Commission's guidance that is applicable to exported energy from rooftop solar in its Avoided Cost Methodology.

- The Commission should adopt an approach for identifying potential transmission and distribution deferrals and to determine the value of such deferrals.
- The Company should be required to conduct load flow and other appropriate studies to quantify the expected loss reduction impact of DERs and ensure loss reductions across all appropriate distribution system segments are accounted for.

- The Company should initiate a stakeholder engagement process on the concept of formula rates, as well as investigate the appropriate performance metrics and safeguards required to ensure optimal desired outcomes.

Q. Does this conclude your direct testimony?

A. Yes.

Exhibit VS-1: CV of Ronny Sandoval

Ronny Sandoval

Regulatory Director, Interior West | Vote Solar | Colorado Office | 720-295-0879 | ronny@votesolar.org

SUMMARY

Maximize opportunities for modernizing the electric system and accelerate clean energy adoption, including through collaboration with a variety of energy stakeholders, including national and regional organizations. Provide expert testimony and develop thought leadership on issues including system planning, grid modernization, and energy efficiency before public utility commissions across several states and regions.

PROFESSIONAL EXPERIENCE

Vote Solar, Boulder, CO
Regulatory Director – Interior West, 2020-Present.
Lead the organization's efforts to transform the electric system and maximize opportunities for sustainable energy in the Interior West.

ROS Energy Strategies, LLC, Boulder, CO
President, 2019-Present.
Provide strategy consulting services to industry stakeholder clients on energy issues.

Interstate Renewable Energy Council, Latham, N.Y.
Board of Directors, 2019-Present.
Perform all board duties including serving on strategy and policy committees.

GridWise Alliance, Washington D.C.
Board of Directors, 2017-Present.
Perform all board duties including serving on board operations, member products, and outreach committees.

Environmental Defense Fund, New York, NY
Senior Director, Grid Modernization, 2018-2019; *Director, Grid Modernization, 2015-2018; Senior Manager, Clean Energy Idea Bank, 2013-2015;*
Managed all aspects of EDF's national grid modernization program in driving investments that increase the efficiency of the electric system and enable the integration of emerging sources of energy, including establishing priorities and positions, and managing budgets, internal staff and consultant teams. Developed effective partnerships to socialize thought leadership and experiences across regions, sectors, and formal regulatory engagements.

Consolidated Edison Company of New York, Inc., New York, NY
Senior Specialist, Energy Efficiency and Demand Management, 2010-2013.
Managed efforts to increase energy efficiency and reduce peak electricity use in capacity constrained areas of the system and forecasted the long-range impacts of energy efficiency programs for system and capital planning.
Engineer, Transmission Planning, 2008-2010; Associate Engineer, Transmission Planning, 2006-2007
Performed technical studies and developed capital system reinforcement plans needed to serve customers' growing demand for electricity.
Management Associate, 2004-2005.
Supervised operations staff and performed management functions across Con Edison's electric, gas, and steam organizations, as part of company's management training "GOLD" program.

THOUGHT LEADERSHIP

Testimony on behalf of Citizens Action Coalition and Environmental Law & Policy Center on Indianapolis Power & Light's Transmission, Distribution and Storage System Improvement Charge Petition
Indiana Utility Regulatory Commission — **October 2019**

Testimony on behalf of Local Environmental Organizations on Puerto Rico Electric Power Authority's Integrated Resource Plan
Puerto Rico Energy Bureau — **October 2019**

EDF Comments on Hawaiian Electric Companies' "Modernizing Hawai'i's Grid for Our Customers" Plan
Public Utilities Commission, State of Hawai'i — **September 2017**

EDF Testimony on Rockland Electric Company Advanced Metering Program
Board of Public Utilities, State of New Jersey — **September 2016**

EDF Testimony on First Energy Rate Cases
Pennsylvania Public Utilities Commission — **June 2016**

EDF Settlement Supporting Testimony – Duke Energy Indiana Transmission, Distribution and Storage System Improvement Charge Petition
Indiana Utility Regulatory Commission — **March 2016**

EDF Comments on Straw Proposal on the Modernization of the Electric Grid
Commonwealth of Massachusetts, Department of Public Utilities — **January 2013**

PUBLICATIONS AND COMMUNICATIONS

A Distributed Energy Resource Roadmap for Puerto Rico: Phase I Report Queremos Sol Coalition	**November 2019**
"The Climate Champions Podcast: Ronny Sandoval, Board Member, IREC & GWA"" Krevat Energy Innovations	**May 2019**
"New Microgrid Initiative Launches in Puerto Rico Amid Energy Policy Uncertainty"" Greentech Media	**March 2019**
"The Interaction Between Distributed Solar and Wholesale Markets" SEIA / SEPA Solar Power New York	**December 2018**
"Grid Reliability and Resilience" Vermont Law School Energy Symposium – Wires, Wind, and Resiliency	**October 2018**
"Voltage Management: Quick Wins for System Efficiency"" Smart Grid Northwest – GridFWD 2018	**October 2018**
"Building Resilient Cities: Emergency Preparedness and Smart Solutions" Congressional Hispanic Caucus Institute Leadership Conference	**September 2018**
"A Roadmap for a Clean, Modern Electric Grid" Smart Energy Consumer Collaborative	**August 2018**
"Making the Grid Smart: Moving Toward Two-Way Communication in the Digital Age" Department of Energy Peer Exchange	**April 2018**
"State Grid Modernization Trends" Smart Electric Power Alliance Utility Conference	**April 2018**
"Grid Modernization: The Foundation for Climate Change Progress" Environmental Defense Fund	**December 2017**
"Transportation, Energy and the Environment: Modernizing the Grid" Texas Tribune Festival	**September 2017**
"Valuing Distributed Energy Resources" Smart Electric Power Alliance Grid Evolution Summit	**July 2017**
"The US Electric Grid: Present and Future" Columbia University Energy Symposium	**February 2017**
"The Benefits of a Smarter Grid: The 3rd Grid Modernization Index" Department of Energy / International Smart Grid Action Network	**May 2016**
"Carbon Emissions and Energy Storage Systems" Electricity Today Magazine	**March 2015**
"Harnessing the Hidden Efficiency: Voltage and Reactive Power Management" National Conference and Global Forum on Science, Policy and the Environment	**January 2015**
"Grid Modernization Strategies" The Electricity Forum Magazine	**April 2014**
"Energy Efficiency as a Transmission and Distribution Resource" Regulatory Assistance Project	**September 2012**

EDUCATION

New York University - Stern School of Business, New York, NY
Master of Business Administration, Specializations: Finance, Law & Business, Management of Technology & Operations, 2011.

Stevens Institute of Technology, Hoboken, NY
Bachelor of Engineering, Electrical Engineering, 2004.

New York University, New York, NY
Bachelor of Science, Mathematics, 2004.

CERTIFICATIONS

Certified Energy Manager, 2012; Business Energy Professional, 2011; Six Sigma Champion, 2011.

Exhibit VS-2: Compiled Responses to Data Requests

Rodney J. Ross
Manager
State Regulatory Affairs

Mail Station 9708
PO Box 53999
Phoenix, Arizona 85072-3999
Tel 602-250-4944
Rodney.Ross@aps.com

January 21, 2020

Court S. Rich
Rose Law Group pc
7144 E. Stetson Drive, Suite 300
Scottsdale, Arizona 85251

RE: SEIA's First Set of Data Requsts to
Arizona Public Service Company (APS or Company)
Docket No. E-01345A-19-0236

Dear Mr. Rich:

Attached is the Company's response to Questions 1.1, 1.3, 1.4, 1.6, 1.8, 1.9, 1.11, 1.13 and 1.14 of SEIA's First Set of Data Requests in the above docket. Responses to the remaining questions wil be provided as soon as possible.

Please be aware that one of the documents in response to Question 1.14 is Confidential and will be provided upon execution of a Protective Agreement in this docket.

Please let me know if you have any questions.

Sincerely,

Rodney J. Ross

RJR/bgs
Attachments

cc: Hopi Slaughter

SOLAR ENERGY INDUSTRIES ASSOCIATION'S FIRST SET OF DATA REQUESTS TO ARIZONA PUBLIC SERVICE COMPANY REGARDING THE APPLICATION TO APPROVE RATE SCHEDULES DESIGNED TO DEVELOP A JUST AND REASONABLE RATE OF RETURN DOCKET NO. E-01345A-19-0236 JANUARY 10, 2020

SEIA 1.1: Please provide all direct testimony and exhibits in a digitally-native format (e.g. one that was not printed and scanned, but saved directly as a digital file). For filings that are primarily narrative in nature (such as direct testimony), please provide in PDF format. For files that are primarily quantitative in nature (such as certain attachments to direct testimony and Schedule B), please provide in the native format (e.g. Excel) with original formulas intact.

Response: Native file formats of the Company's Application, Testimony, and Exhibits are available on the APS 2019 Rate Case Extranet Site at the following links:

Application, Standard Filing Requirements and Rate Schedules:
https://apsonline.sharepoint.com/teams/2019RateCase/SitePages/PublicApplication.aspx

Testimony and Attachments:
https://apsonline.sharepoint.com/teams/2019RateCase/SitePages/PublicTestimonyDirect.aspx

Witness: All

SOLAR ENERGY INDUSTRIES ASSOCIATION'S FIRST SET OF DATA REQUESTS TO ARIZONA PUBLIC SERVICE COMPANY REGARDING THE APPLICATION TO APPROVE RATE SCHEDULES DESIGNED TO DEVELOP A JUST AND REASONABLE RATE OF RETURN DOCKET NO. E-01345A-19-0236 JANUARY 10, 2020

SEIA 1.3: Please provide the most recent complete, fully functional models listed below that will allow intervenors to make adjustments to key metrics and that will propagate these changes through the model. To the extent that any model links to external worksheets, provide them as well.

a) Cost of service model
b) Loss of load expectation model
c) Probability of peak model
d) Effective load carrying capacity model
e) Rate design model
f) Class load profile study model

Response:

a) The cost of service model is provided as workpaper LRS-WP11DR and is available on the APS 2019 Rate Case Extranet Site.

b) No loss of load expectation model was used to produce any information included in testimony in this rate case.

c) APS does not use a "probability of peak model."

d) APS uses a top 90 hours proxy method to approximate the ELCC. This model is provided as APS19RC00313 in response to SEIA 1.14(a).

e) The rate design model is provided as workpaper JEH-WP1DR (proof of revenue) and is available on the APS 2019 Rate Case Extranet Site.

f) The class load profile study model is provided as APS19RC00279 through APS19RC00282 (load data reports) in response to APS's Initial Data Request 1.31 and is available on the APS 2019 Rate Case Extranet Site.

Witnesses: Leland Snook, Jessica Hobbick and Brad Albert

SOLAR ENERGY INDUSTRIES ASSOCIATION'S FIRST SET OF DATA REQUESTS TO ARIZONA PUBLIC SERVICE COMPANY REGARDING THE APPLICATION TO APPROVE RATE SCHEDULES DESIGNED TO DEVELOP A JUST AND REASONABLE RATE OF RETURN DOCKET NO. E-01345A-19-0236 JANUARY 10, 2020

SEIA 1.4: Please refer to the Direct Testimony of Barbara D. Lockwood at 18-19.

a) Please provide the vendor and product platform of the older aps.com site.
b) Which aspects of the older aps.com site were no longer supported by the vendor?
c) Please provide the vendor and product platform of the proposed, upgraded aps.com site.
d) If the upgraded aps.com site is live, when did it go live? If it is not yet live, when will it go live?

Response: a) The vendor and product platform of the older aps.com site was an unsupported version of Microsoft SharePoint.

b) The entire platform of the older aps.com site was no longer supported by the vendor.

c) The vendor for the upgrade was Sitecore. APS is currently utilizing the platform Sitecore version 9.1.

d) The new aps.com site was launched on September 28, 2019.

Witness: Barbara Lockwood

SOLAR ENERGY INDUSTRIES ASSOCIATION'S FIRST SET OF DATA REQUESTS TO ARIZONA PUBLIC SERVICE COMPANY REGARDING THE APPLICATION TO APPROVE RATE SCHEDULES DESIGNED TO DEVELOP A JUST AND REASONABLE RATE OF RETURN DOCKET NO. E-01345A-19-0236 JANUARY 10, 2020

SEIA 1.6: Please refer to the Direct Testimony of Barbara D. Lockwood at 22-23.

a) Please provide a description of each of the seven adjustment clauses currently in effect, including a high-level overview of what costs are included and the magnitude of the adjustment for a typical residential customer.
b) How much of the approximately 6.5%, or $10 per month, reduction referenced on page 23 was due specifically to the lower tax rate realized through the TEAM adjustment clause?
c) Excluding the TEAM adjustment clause, what was the change in residential customer bills due to changes in the Company's other adjustment clauses?

Response: a) The Company's currently effective adjustment clauses are described in comments filed by APS in Docket No. AU-00000A-19-0080 on December 20, 2019. These comments can be found at this link:

https://docket.images.azcc.gov/E000004199.pdf

Please see Figure 2 on page 21 of the Direct Testimony of Leland Snook for the magnitude of each adjustment for an average customer.

b) Please see Figure 2 in Mr. Snook's Direct Testimony.

c) Please see Figure 2 in Mr. Snook's Direct Testimony.

Witness: Leland Snook

SOLAR ENERGY INDUSTRIES ASSOCIATION'S FIRST SET OF DATA REQUESTS TO ARIZONA PUBLIC SERVICE COMPANY REGARDING THE APPLICATION TO APPROVE RATE SCHEDULES DESIGNED TO DEVELOP A JUST AND REASONABLE RATE OF RETURN DOCKET NO. E-01345A-19-0236 JANUARY 10, 2020

SEIA 1.8: Please refer to the Direct Testimony of Leland R. Snook at 11. Please provide all analyses or reports that support the statement: "From APS's perspective, this customer group does not presently provide sufficient resource adequacy for APS to exclude a portion of the customer's load as a resource planning obligation."

Response: There was no specific study performed.

Witness: Leland Snook and Brad Albert

SOLAR ENERGY INDUSTRIES ASSOCIATION'S FIRST SET OF DATA REQUESTS TO ARIZONA PUBLIC SERVICE COMPANY REGARDING THE APPLICATION TO APPROVE RATE SCHEDULES DESIGNED TO DEVELOP A JUST AND REASONABLE RATE OF RETURN DOCKET NO. E-01345A-19-0236 JANUARY 10, 2020

SEIA 1.9: Please refer to the Direct Testimony of Leland R. Snook at 17.

a) Does the Company perform any weather normalization on peak demand values, or only on energy values, when making weather normalization pro forma adjustments?
b) Please provide the 4CP, class NCP, AED, sum of individual max, and kWh values for each class for the past 5 years. If available, please provide weather-normalized values of these metrics as well.

Response: a) The Company's weather normalization pro forma applies only to energy values.

b) The Company only develops AED and weather normalization values using these metrics for purposes of supporting a rate case. AED information for the Test Year in this case can be found in workpaper LRS-WP4DR, while weather normalization kWh values are provided in response to the Company's Initial Data Request 1.22 in document APS19RC00275.

The remaining data requested (4CP, class NCP, sum of individual max, and kWh values) for the years 2016 through 2018 and for the Test Year are provided in the Company's response to Initial Data Request 1.31 in documents APS19RC00279, APS19RC00280, APS19RC00281, and APS19RC00282 respectively.

Responses to Initial Data Requests are available on the APS 2019 Rate Case Extranet Site at the following link:

https://apsonline.sharepoint.com/teams/2019RateCase/SitePages/PublicData.aspx

These values for the years 2014 and 2015 are attached as APS19RC00310 and APS19RC00311.

Witness: Leland Snook

SOLAR ENERGY INDUSTRIES ASSOCIATION'S FIRST SET OF DATA REQUESTS TO ARIZONA PUBLIC SERVICE COMPANY REGARDING THE APPLICATION TO APPROVE RATE SCHEDULES DESIGNED TO DEVELOP A JUST AND REASONABLE RATE OF RETURN DOCKET NO. E-01345A-19-0236 JANUARY 10, 2020

SEIA 1.11: Please refer to Attachment JEH-2DR. Is the increase in the Basic Service Charge in any way related to the implementation of a Super Off-Peak Energy Charge? If so, please explain in detail.

Response: No.

Witness: Jessica Hobbick

SOLAR ENERGY INDUSTRIES ASSOCIATION'S FIRST SET OF DATA REQUESTS TO ARIZONA PUBLIC SERVICE COMPANY REGARDING THE APPLICATION TO APPROVE RATE SCHEDULES DESIGNED TO DEVELOP A JUST AND REASONABLE RATE OF RETURN DOCKET NO. E-01345A-19-0236 JANUARY 10, 2020

SEIA 1.13: Please refer to the direct testimony of Brad J. Albert at 18.

a) What is the justification for the use of a "top 90 hours proxy" in the Company's ELCC analysis?
b) Are the line losses used to gross up avoided capacity and energy costs average line losses or marginal line losses?
c) Please provide the Company's most recent line loss study.

Response:

a) The top 90 hours proxy method provides a reasonable estimate of the ELCC and can be performed and replicated in an efficient manner.

b) The capacity and energy losses are grossed up using average losses.

c) APS provided the most recent line loss study in the Company's response to Initial Data Request 1.17 as APS19RC00274 which is available on the APS 2019 Rate Case Extranet Site.

Witness: Brad Albert

SOLAR ENERGY INDUSTRIES ASSOCIATION'S FIRST SET OF DATA REQUESTS TO ARIZONA PUBLIC SERVICE COMPANY REGARDING THE APPLICATION TO APPROVE RATE SCHEDULES DESIGNED TO DEVELOP A JUST AND REASONABLE RATE OF RETURN DOCKET NO. E-01345A-19-0236 JANUARY 10, 2020

SEIA 1.14: Please refer to Attachment BJA-1DR.

a) Provide all workpapers, studies, and analyses that were used to develop the summary figures in this attachment in their complete original format with formulas intact. This request extends to workpapers that were used to develop specific figures (e.g. the annual ELCC values), not just the values themselves.
b) Why are only substation losses included in the distribution loss value?
c) What is the total distribution system line loss value?
d) What is the process that the Company uses for determining whether distribution assets can be delayed or avoided?
e) Other jurisdictions (for instance, California's DER Action Plan and New York's REV) have developed system-wide avoided distribution cost estimates. Has the Company considered implementing a similar process in its service territory?
f) Has the Company performed feeder-level load forecasts in its territory?
g) What costs are included in the "metering and customers costs" that are estimated to be $0.01508/kWh?
h) Please provide all workpapers and analyses used to support the metering and customer cost value of $0.01508/kWh.
i) Does the Company have data and forecasts that would allow it to extend this analysis beyond the 5-year time horizon? If so, how long could the analysis be extended?
j) Could the installation of an energy storage system change the fraction of energy that is exported by a customer or change the timing of when that energy is exported? If so, has the Company performed any analysis on how this might impact the avoided cost methodology?
k) Over what timeframe (e.g. monthly, 5-minute, instantaneous) is the data on exported energy determined?

Response:

a) The requested information is attached in the following native files:
   - ExcelAPS19RC00312 – the avoided cost calculation which is the working model supporting BJA-1DR;
   - ExcelAPS19RC00313 – ELCC-Generation computation showing the hourly rooftop solar data used to determine the export percent and the ELCC (top 90 hour) calculation for generation and transmission capacity value. The ELCC value for distribution is calculated by zeroing out values in the "Renewables" tab. This model is Confidential and will be provided upon execution of a Protective Agreement.

SOLAR ENERGY INDUSTRIES ASSOCIATION'S
FIRST SET OF DATA REQUESTS TO
ARIZONA PUBLIC SERVICE COMPANY REGARDING
THE APPLICATION TO APPROVE RATE SCHEDULES DESIGNED TO
DEVELOP A JUST AND REASONABLE RATE OF RETURN
DOCKET NO. E-01345A-19-0236
JANUARY 10, 2020

Response to SEIA 1.14 (continued):

- ExcelAPS19RC00320 - the line loss study.

b) Distribution losses are comprised of losses through:
   - Service drop and service entrance;
   - Distribution transformer;
   - Distribution feeder line; and
   - Distribution substation transformer.

   When residential rooftop solar is exported to the grid, it generally has to travel across the first three elements before it is delivered to other customers, and incurs losses. Therefore, residential rooftop solar exports only avoid the distribution substation transformer losses.

c) Total distribution losses for the four components specified in b) above are 5.69% for peak and 5.88% for energy.

d) APS Distribution Engineering performs an annual review of system-wide load growth at the individual feeder and substation transformer level. Forecasted load growth assumptions are developed over a 5-year horizon for individual distribution feeders, and a 10-year horizon for substation transformers which require longer lead-times to site and build.

   In 2018, APS Transmission and Distribution (T&D) implemented a screening and evaluation criteria (which was mirrored after the Joint Utilities of NY Supplemental Information on the Non-Wires Alternatives Identification and Sourcing Process and Notification Practices) for evaluating all proposed T&D projects against an energy storage alternative. The factors included in this evaluation include expected cost threshold for traditional solution, anticipated load growth over the planning horizon, and required need-date to meet the expected load growth. Any projects that fall within these thresholds are evaluated further for detailed evaluation for a non-wire alternative.

e) As response to item (d) above indicates, APS has kept abreast of developments in other states with evolving grid planning practices dockets, particularly CA, HI and NY. As stated in our 2017 Integrated Resource Plan (IRP), APS has explored distribution avoided cost concepts for future implementation (see "DSM Programs Development", page 67).

SOLAR ENERGY INDUSTRIES ASSOCIATION'S FIRST SET OF DATA REQUESTS TO ARIZONA PUBLIC SERVICE COMPANY REGARDING THE APPLICATION TO APPROVE RATE SCHEDULES DESIGNED TO DEVELOP A JUST AND REASONABLE RATE OF RETURN DOCKET NO. E-01345A-19-0236 JANUARY 10, 2020

Response to SEIA 1.14 (Continued):

To this end, APS's DSM Implementation Plans have continued to invest in customer-side resources with market-based solutions included demand response, energy storage and non-wires alternatives that provide capability to unlock distribution system deferral value as opportunities are identified.

f) As response to item (d) above indicates, APS develops feeder-level load forecasts for its service territory.

g) "Metering and customer costs" include distribution (customer accounts, customer service, sales) metering, billing, and meter reading.

h) APS response to Kroger 1.2 indicates that metering and customer costs are $17 per month more for solar customers than for nonsolar customers. The calculation of $0.01508/kWh is attached as ExcelAPS19RC00314.

i) The Company generally has data and forecasts that would allow it to extend the avoided cost analysis to twenty years.

j) Depending on how the customer operates energy storage in conjunction with rooftop solar, it is possible that installation of an energy storage system could change the fraction of energy that is exported by the customer or change the timing of when that energy is exported. However, although this may change avoided cost values, it would not change the avoided cost methodology.

k) Rooftop solar export energy is integrated on an instantaneous basis, and modeled for avoided cost purposes on an hourly basis.

Rodney J. Ross
Manager
State Regulatory Affairs

Mail Station 9708
PO Box 53999
Phoenix, Arizona 85072-3999
Tel 602-250-4944
Rodney.Ross@aps.com

February 14, 2020

Court S. Rich
Rose Law Group pc
7144 E. Stetson Drive, Suite 300
Scottsdale, Arizona 85251

RE: SEIA's Fourth Set of Data Requests to
Arizona Public Service Company (APS or Company)
Docket No. E-01345A-19-0236

Dear Mr. Rich:

Arizona Public Service Company's (APS or Company) response to SEIA's Fourth Set of Data Requests in the above docket is available on the APS 2019 Rate Case SharePoint Extranet Site.

Please let me know if you have any questions.

Sincerely,

Rodney J. Ross

RJR/bgs

cc: Hopi Slaughter

SOLAR ENERGY INDUSTRIES ASSOCIATION'S FOURTH SET OF DATA REQUESTS TO ARIZONA PUBLIC SERVICE COMPANY REGARDING THE APPLICATION TO APPROVE RATE SCHEDULES DESIGNED TO DEVELOP A JUST AND REASONABLE RATE OF RETURN DOCKET NO. E-01345A-19-0236 JANUARY 4, 2020

SEIA 4.1: Please refer to workpaper LRS_WP4DR (Development of Allocation Factors Report) and Initial 1.31_APS19RC00282 (2018-19 Load Research Report).

a. Please provide the workpapers that were used to calculate the various class characteristics (e.g. Energy (ACC), NCP (ACC), etc.) found in the Development of Allocation Factors Report from the underlying data in the 2018-19 Load Research Report. Workpapers should be in their original format with all formulas intact.

b. Some rate classes with data in the Load Research Report are not in the Development of Allocation Factors Report (e.g. R-TECH). Please explain which rate classes these were grouped into in the Development of Allocation Factors Report and what basis was used to exclude a particular class from being analyzed individually.

c. For each category contained in the 2018-2019 Load Research Report (e.g. Demand Rate, New Solar, E-12), please provide a hierarchy showing which categories are subsets of other categories. For instance, it appears that Energy Rate No Solar is a subset of Energy Rate.

d. Were the values in the 2018-19 Load Research Report based on sample meters, or derived directly from AMI meters?

e. Is the answer to d) the same for all residential sub classes? If not, please indicate which method was used for each subclass.

f. What costs, if any, are allocated based on the 1 CP allocator?

g. Please provide the dates and hours of the 1 CP and 4 CP peaks for 2016-2019.

h. Confirm that the 4CP values found in the Development of Allocation Factors Report represent the average of the Class Peak On Peak values for June through September in the 2018-19 Load Research Report. If deny, please provide workpapers that contain the values needed to derive the 4CP values.

i. The tab "Schedule G7" in the Development of Allocation Factors Report contains all hardcoded values. Provide a version of the Development of Allocation Factors Report with

SOLAR ENERGY INDUSTRIES ASSOCIATION'S FOURTH SET OF DATA REQUESTS TO ARIZONA PUBLIC SERVICE COMPANY REGARDING THE APPLICATION TO APPROVE RATE SCHEDULES DESIGNED TO DEVELOP A JUST AND REASONABLE RATE OF RETURN DOCKET NO. E-01345A-19-0236 JANUARY 4, 2020

SEIA 4.1 (continued):

all formulas intact. If values from the tab "Schedule G7" refer to files external to the Development of Allocation Factors Report workbook, provide them as well in their original format with formulas intact.

j. The tab "Weighted Energy" in the Development of Allocation Factors Report contains hardcoded values for the "Annual Fuel Cost @ Generation" for each customer class. Please provide the source workpapers for these values in their original format with formulas intact.

k. For each residential rate class in the Development of Allocation Factors Report, provide the on-peak Class Peak value that occurred at the time of the "Total Residential" on-peak date and time value in the 2018-19 Load Research Report. For solar customers, provide the site, delivered, and produced values of these figures.

l. Why are customer-based costs (such as meters and OH service) allocated based on the customer count at the end of the year, instead of based on the average number of customers in the year, as is done on the Proof of Revenue workpaper?

Response:

a. Please refer to Initial Data Request 1.31 and the Excel file version of workpaper LRS_WP4DR provided on the APS 2019 Test Year Rate Case extranet site.

b. Rate classes are assigned a cost-of service class based on a number of factors such as size, usage patterns, and cost drivers. Some rates are their own cost-of-service class while others are combined with other similar rates. The R-Tech rate was combined with the other residential demand rates because it does not have enough participation at this time to determine if it warrants its own class. A mapping of rate classes to cost-of-service classes is provided in Attachment APS19RC00419.

c. Please see part b.

d. The values were based on a census of AMI meters for all Residential and most Non-Residential rates, with some customer accounts removed for incomplete data. Some Non-residential classes used a census of non-AMI interval meters.

SOLAR ENERGY INDUSTRIES ASSOCIATION'S
FOURTH SET OF DATA REQUESTS TO
ARIZONA PUBLIC SERVICE COMPANY REGARDING
THE APPLICATION TO APPROVE RATE SCHEDULES DESIGNED TO
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DOCKET NO. E-01345A-19-0236
JANUARY 4, 2020

Response to SEIA 4.1 (continued):

e. Yes.

f. None. The 1-CP information is used to derive the average and excess allocator – Demprod1.

g. Please see APS's response to Initial Data Request 1.31.

h. Yes. Correct.

i. The information and formulas can be found in the Cost-of-Service Model, "Cost of Service" tab, beginning in row 1767.

j. Please see Attachment ExcelAPS19RC00529.

k. APS did not perform this analysis. However, the information necessary to perform this analysis is provided in the Company's response to SEIA 4.10 and Initial Data Request 1.31.

l. The Proof-of-revenue includes a pro forma adjustment to annualize revenues for year-end customer growth to the end of the Test Year. Therefore, it is consistent with the cost allocation.

SOLAR ENERGY INDUSTRIES ASSOCIATION'S FOURTH SET OF DATA REQUESTS TO ARIZONA PUBLIC SERVICE COMPANY REGARDING THE APPLICATION TO APPROVE RATE SCHEDULES DESIGNED TO DEVELOP A JUST AND REASONABLE RATE OF RETURN DOCKET NO. E-01345A-19-0236 JANUARY 4, 2020

SEIA 4.2: Please refer to workpaper LRS_WP4DR (Development of Allocation Factors Report) and Initial 1.31_APS19RC00282 (2018-19 Load Research Report).

a. Confirm that "site" represents the gross load of a customer (i.e. load met by both solar generation and grid power) while "delivered" represents the net load of a customer (i.e. load met by grid power). If deny, please explain the difference between these values.

b. Confirm that the Development of Allocation Factors Report uses the "site" values rather than the "delivered" values from the 2018-19 Load Research Report for residential solar rate classes. If deny, please reconcile the values between these two workpapers.

c. Please explain how the "site", "delivered", and "produced" values for an individual customer in an individual hour are determined. Include a discussion and mathematical examples of what meters are used, how instantaneous power flows are integrated, and how integrated power flows are combined to produce these values. Also include a discussion on how these values are calculated when a single hour has some duration where the household is exporting energy and some duration when the household is importing energy.

d. Confirm that the Development of Allocation Factors Report uses "delivered" values (as defined above) from the 2018-19 Load Research Report for nonresidential customers that have solar. If deny, please reconcile the values between these two workpapers and provide load studies and allocation factor workpapers that break out non-commercial solar customers.

e. Why does the Company differentiate between "site" and "delivered" load when allocating costs for residential solar customers but not when allocating costs for non-residential customers?

f. Does the Company serve the "delivered" energy and demand of a solar customer, or does it serve the "site" energy and demand of a solar customer?

g. What is the basis for using "site" energy and demand when establishing cost allocators for residential solar customers?

SOLAR ENERGY INDUSTRIES ASSOCIATION'S FOURTH SET OF DATA REQUESTS TO ARIZONA PUBLIC SERVICE COMPANY REGARDING THE APPLICATION TO APPROVE RATE SCHEDULES DESIGNED TO DEVELOP A JUST AND REASONABLE RATE OF RETURN DOCKET NO. E-01345A-19-0236 JANUARY 4, 2020

SEIA 4.2 (continued):

h. Has the Commission explicitly ruled on the appropriateness of using "site" or "delivered" energy when establishing cost allocators for residential solar customers? If so, please provide the Commission order and page reference.

Response:

a. Yes. Correct.

b. Yes. Correct.

c. A solar customer has a bi-directional meter that measures delivered and received energy, where delivered energy is energy APS delivers to the customer and received energy is exported from the customer to the APS grid. Additionally, a solar customer has a production meter that measures the solar generation. Through the course of an hour, the bi-directional meter integrates near instantaneous measurements of delivered and received energy to create hourly intervals for both of these values. The production meter measures "produced" energy in a similar manner. Site load is then calculated afterwards by the equation

$$\text{Site} = \text{Delivered} + \text{Produced} - \text{Received}$$

where each value represents an integrated hour. During an hour where there is both received and delivered energy, the intervals for delivered, received, and produced energy are calculated independently and all three would have separate positive values. After which, Site is then calculated by the equation above.

d. Yes. The non-residential solar customers were not broken out in to a separate cost-of-service class. Therefore, they were allocated costs based on delivered load, similar to the non-solar customers in their class.

e. The Company did not propose a separate cost-of-service class for non-residential solar customers in this proceeding. This is because the non-residential rates typically recover a high percentage of grid costs through demand charges rather than energy charges, which is more aligned with the cost to serve these customers. In addition, the adoption of behind the meter solar for the general service class is significantly lower than for the residential class.

SOLAR ENERGY INDUSTRIES ASSOCIATION'S FOURTH SET OF DATA REQUESTS TO ARIZONA PUBLIC SERVICE COMPANY REGARDING THE APPLICATION TO APPROVE RATE SCHEDULES DESIGNED TO DEVELOP A JUST AND REASONABLE RATE OF RETURN DOCKET NO. E-01345A-19-0236 JANUARY 4, 2020

Response to SEIA 4.2 (continued):

f. The company serves the site load for generation capacity and grid capacity costs, with an offset for the solar capacity contribution; the grid capacity cost necessary to facilitate the export solar power; the delivered energy costs, and the customer hook-up costs for the site load.

g. Please see APS's response to SEIA 2.6.b

h. The Arizona Corporation Commission has ruled that residential rooftop solar customers are different than other residential customers from a cost perspective because they are partial requirements customers that export power to the grid. Therefore, they should be treated as a separate class in a cost-of-service study. However, the Commission left the cost allocation methods to be determined in the specific utility rate cases. See Decision No. 75859 in Docket E-00000J-14-0023. The method used by the Company in this proceeding is the same method used in the sited docket and in the prior APS rate case.

SOLAR ENERGY INDUSTRIES ASSOCIATION'S
FOURTH SET OF DATA REQUESTS TO
ARIZONA PUBLIC SERVICE COMPANY REGARDING
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JANUARY 4, 2020

SEIA 4.3: Please refer to LRS_WP11DR Cost of Service Study Model. Please provide the source documents for the value of the "Solar Energy Credit" found in cells H6750:H6753 in tab "Import". Please also provide a narrative description of how this value was calculated and what it represents.

Response: The solar energy credit represents the energy value of solar production, which is credited against the allocated cost-of-service for the site load. It is based on hourly solar production and the relevant avoided energy cost. See Attachment ExcelAPS19RC00531. Also, please refer to SEIA 2.6.b.

Witness: Leland Snook

RESIDENTIAL UTILITY CONSUMER OFFICE'S THIRD SET OF DATA REQUESTS TO ARIZONA PUBLIC SERVICE COMPANY REGARDING THE APPLICATION TO APPROVE RATE SCHEDULES DESIGNED TO DEVELOP A JUST AND REASONABLE RATE OF RETURN DOCKET NO. E-01345A-19-0236 FEBRUARY 4, 2020

SEIA 4.4: Please refer to JEH-WP1DR (Proof of Revenue) and Initial 1.31_APS19RC00282 (2018-19 Load Research Report). On tab "R-XS" of the Proof of Revenue work paper, the sum of Summer Days and Winter Days divided by 365 (which should represent the average number of customers in this customer class) is 271,309. However, the average number of customers in tab "H-2 Step 2 FINAL" for R-XS is 262,514. Further, the value for average customers from the 2018-2019 Load Research Report for R-XS is 262,667. Please explain the discrepancy between these figures.

Response: The average customer count is lower than the average annual billed days because the former excludes certain customers that establish service or discontinue service partway through a month, while the latter counts all of the billed days in that month.

The average customer count in the 2018-2019 Load Research Report is slightly higher because the number for January inadvertently reflects the count in December, and the number for June reflects May. This error is *de minimis* and does not impact the analysis.

Witness: Jessica Hobbick

SOLAR ENERGY INDUSTRIES ASSOCIATION'S FOURTH SET OF DATA REQUESTS TO ARIZONA PUBLIC SERVICE COMPANY REGARDING THE APPLICATION TO APPROVE RATE SCHEDULES DESIGNED TO DEVELOP A JUST AND REASONABLE RATE OF RETURN DOCKET NO. E-01345A-19-0236 JANUARY 4, 2020

SEIA 4.5: Please refer to JEH-WP1DR (Proof of Revenue).

a. Provide all workpapers and analysis that were used to develop the specific value of the present grid access charge for TOU-E customers of $0.93 per kW DC.

b. Please provide a narrative discussion of how this value was calculated and what costs are intended to be collected through the grid access charge for solar customer on the TOU-E rate.

Response:

a. The present grid access charge was developed and approved by the Arizona Corporation Commission as part of a settlement in the prior rate case, Docket No. E-01345A-16-0036, et. al. The approved amount was the result of negotiations and therefore not derived from any specific cost basis. The charge was instead set to provide a certain level of expected bill savings per kWh to solar customers. Please see Attachment ExcelAPS19RC00532.

b. Please see APS's response to 4.5a. The charge was adopted to help address the $1 billion cost shift from residential solar customers to other customers as the result of the solar customers paying less than their cost of service. Refer to Docket Nos. E-013451-16-0036 et. al. and E-00000J-14-0023.

Witness: Jessica Hobbick

SOLAR ENERGY INDUSTRIES ASSOCIATION'S FOURTH SET OF DATA REQUESTS TO ARIZONA PUBLIC SERVICE COMPANY REGARDING THE APPLICATION TO APPROVE RATE SCHEDULES DESIGNED TO DEVELOP A JUST AND REASONABLE RATE OF RETURN DOCKET NO. E-01345A-19-0236 JANUARY 4, 2020

SEIA 4.6: Please refer to the Company's various workpapers used in the COSS process, and for the purposes of this question, exclude Solar Legacy customers. The Load Research Reports break out solar and non-solar customers in certain rate classes (such as R-TOU-E). Similarly, the Development of Allocation Factors Report separately determines cost allocators based on solar and non-solar customers (such as R-Solar (TOU) and R-TOU) and the Cost of Service Study Model calculates costs separately for solar and non-solar customers. However, the Proof of Revenue workpaper (which the Company indicated was its rate design model), combines solar and non-solar customers back into a single customer class (such as TOU-E).

a. What factors were considered when determining whether to analyze solar customer separately or together with other customers in the customer class?

b. Why did the Company recombine solar and non-solar customers in the rate design worksheet after allocating costs to solar and non-solar customers separately?

Response:

a. In Decision No. 75859 in Docket No. E-00000J-14-0023 the Commission concluded that residential solar customers should be a different class in a cost-of-service study. Customers are typically combined into cost-of-service classes based on similar load characteristics and cost drivers. In addition, solar customers are different because they are partial requirements customers with significant energy exports to the grid.

b. The Company did not propose specific rates for non-legacy solar customers in this proceeding. Therefore, they were not separated from other residential customers in same rate classes in the proof of revenue.

Witness: Leland Snook

SOLAR ENERGY INDUSTRIES ASSOCIATION'S FOURTH SET OF DATA REQUESTS TO ARIZONA PUBLIC SERVICE COMPANY REGARDING THE APPLICATION TO APPROVE RATE SCHEDULES DESIGNED TO DEVELOP A JUST AND REASONABLE RATE OF RETURN DOCKET NO. E-01345A-19-0236 JANUARY 4, 2020

SEIA 4.7: Please refer to workpaper LRS_WP4DR (Development of Allocation Factors Report) and Initial 1.31_APS19RC00282 (2018-19 Load Research Report).

a. Confirm that the Company treats customers on different residential tariffs (e.g. R-XS, R-Basic, etc.) as their own customer class for the purposes of establishing cost allocation factors.

b. Is it the case that distribution assets that serve residential customers generally serve a mix of residential customer classes, or generally serve a single class of residential customers?

c. Does the Company separately track assets that are used to serve different residential classes, such as the number of transformers serving customers in the R-XS class?

d. Confirm that the dates and times that individual customers classes attained their on-peak class peak sometimes differs from when the total residential class obtained its on-peak class peak. For instance, the Total Residential class peaked at HE18 on August 5, but the R-XS class peaked on HE18 on July 24.

e. Confirm that if a subclass peaks at a different hour that the parent class, the subclass's demand in that hour is not marginal demand on assets serving that class. If deny, please explain.

f. What are the implications of allocating costs to residential subclasses based on the time that subclass peaked if those times are different than the parent class?

g. The total residential peak from the 2018-19 Load Study Report was 4,022.7 MW, however, the sum of the actual and prorated class peaks of the residential subclasses used in the Development of Allocation Factors Report was 4,285 MW. Given that NCP costs are allocated between commercial and residential classes in part based on the relative share of NCP demand, confirm that the Company's approach results in allocating relatively more NCP demand cost to the residential class as a whole. If deny, please explain.

h. The total 1 CP peak from the 2018-19 Load Study Report was 4,022.7 MW, however, the sum of the 1 CP actual and

SOLAR ENERGY INDUSTRIES ASSOCIATION'S FOURTH SET OF DATA REQUESTS TO ARIZONA PUBLIC SERVICE COMPANY REGARDING THE APPLICATION TO APPROVE RATE SCHEDULES DESIGNED TO DEVELOP A JUST AND REASONABLE RATE OF RETURN DOCKET NO. E-01345A-19-0236 JANUARY 4, 2020

SEIA 4.7 (continued): prorated class peaks of the residential subclasses used in the Development of Allocation Factors Report was 4,130 MW. Given that 1 CP costs are allocated between commercial and residential classes in part based on the relative share of 1 CP demand, confirm that the Company's approach results in allocating relatively more 1 CP demand cost to the residential class as a whole. If deny, please explain.

i. The total residential delivered energy from the 2018-19 Load Study Report was 12,790,832 MWh, however, the sum of the actual and prorated class energy of the residential subclasses used in the Development of Allocation Factors Report was 13,939,142 MWh. Given that energy costs are allocated between commercial and residential classes in part based on the relative share of energy, confirm that the Company's approach results in allocating relatively more energy-related cost to the residential class as a whole. If deny, please explain.

Response:

a. No. Some rates are their own cost-of-service class, while others are combined with other similar rates.

b. Distribution assets can serve a mix of rate classes.

c. No.

d. Yes. Cost-of-service class peaks, which are the individual rates or groups of rates, may differ from a revenue class peak, such as the total Residential Class.

e. Deny. Costs are allocated directly to the individual cost-of-service classes, rather than to the entire revenue class, in order to more accurately reflect the costs attributable to serve those customer groups.

f. It would result in a more accurate assignment of costs to those cost-of-service classes. Please see APS's response to part e.

g. Deny. The cost-of-service study correctly allocated costs based on the individual cost-of-service classes for residential, general service, and classified customers on various rates or groups of rates, rather than on an overall revenue class. Cost allocations were based on the comparative load information for these cost-of-service classes.

SOLAR ENERGY INDUSTRIES ASSOCIATION'S FOURTH SET OF DATA REQUESTS TO ARIZONA PUBLIC SERVICE COMPANY REGARDING THE APPLICATION TO APPROVE RATE SCHEDULES DESIGNED TO DEVELOP A JUST AND REASONABLE RATE OF RETURN DOCKET NO. E-01345A-19-0236 JANUARY 4, 2020

Response to SEIA 4.7 (continued):

h. Please see APS's response to part g. In addition, the Allocation Factors Report includes the site load from residential solar customers in the Residential Class total, while the Load Study Report is based on the delivered load. However, the Residential class is also credited for the cost reductions attributed to the solar generation. Therefore, the cost allocation impact to the Residential class is the net of these two effects. See also the responses to SEIA 4.2.f and 2.6.b

i. Please see APS's response to part g and h.

SOLAR ENERGY INDUSTRIES ASSOCIATION'S FOURTH SET OF DATA REQUESTS TO ARIZONA PUBLIC SERVICE COMPANY REGARDING THE APPLICATION TO APPROVE RATE SCHEDULES DESIGNED TO DEVELOP A JUST AND REASONABLE RATE OF RETURN DOCKET NO. E-01345A-19-0236 JANUARY 4, 2020

SEIA 4.8: Please refer to LRS_WP11DR (Cost of Service Study), LRS_WP4DR (Development of Allocation Factors Report) and Initial 1.31_APS19RC00282 (2018-19 Load Research Report). On the "Control" tab of the Cost of Service Study, the values for the "Demands – Solar Credits" appear to be derived from the 2018-19 Load Research Report. However, there appears to be inconsistencies between the various workpapers in terms of which values are derived from which customer class.

a. The values from the "Legacy Solar (Demand)" customer class in the Allocation Factors Report correspond to the "ECT Solar Site" customer class from the Load Research workpaper, but the values for the "Legacy Solar (Demand)" customer class in the COSS "Control" tab correspond to the "Demand Rate Solar" customer class from the Load Research workpaper.Please explain this inconsistency.

b. The values from the "R-Solar (TOU)" customer class in the Allocation Factors Report correspond to the "R-TOU-E Solar Site" customer class from the Load Research workpaper, but the values for the "R-Solar (TOU)" customer class in the COSS "Control" tab correspond to the "Energy Rate Solar" customer class from the Load Research workpaper. Please explain this inconsistency.

c. The "Demands – Solar Credit" values from the COSS for the Delivered NCP, Site NCP, Delivered Ind Max, and Site Ind Max are all summer average values. However, the cost allocation factors for these are based on the single NCP and Ind Max value. Why did the Company use the summer average rather than the single value in the COSS calculation?

d. Some of the load study demands from customer classes that are used in the allocation workpapers are based on demand levels obtained during off-peak hours. Given that residential rate designs that have a demand charge are only based on the on-peak demand, why are costs allocated in part based on off-peak demands?

Response:

a. The Company has noted this discrepancy and will provide a revised analysis in a supplemental response to this request.

b. The Company has noted this discrepancy and will provide a revised analysis in a supplemental response to this request

Witness: Leland Snook

SOLAR ENERGY INDUSTRIES ASSOCIATION'S
FOURTH SET OF DATA REQUESTS TO
ARIZONA PUBLIC SERVICE COMPANY REGARDING
THE APPLICATION TO APPROVE RATE SCHEDULES DESIGNED TO
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JANUARY 4, 2020

Response to SEIA 4.8 (continued):

c. The solar credit is based on the average summer values because they are more representative of the solar contribution to NCP and Ind Max. For example, the solar performance during one particular NCP hour in the summer could vary considerably depending on weather conditions or other factors. This same risk would not be very likely for the entire load of the home without solar. This is the same method APS used in the COS/VOS proceeding (Decision No. 75859) and in its last rate case.

d. For residential time-of-use rates weekends are considered off-peak even though the weekend loads in the core summer months can be very high, as evidenced by the fact that the rate class non-coincident peak can fall on a weekend during these months. The demand charge only applies to the on-peak hours, which are weekdays, 3-8 pm, excluding holidays, for customer considerations. Delivering costs are driven by non-coincident peak regardless of when it may occur.

SOLAR ENERGY INDUSTRIES ASSOCIATION'S FOURTH SET OF DATA REQUESTS TO ARIZONA PUBLIC SERVICE COMPANY REGARDING THE APPLICATION TO APPROVE RATE SCHEDULES DESIGNED TO DEVELOP A JUST AND REASONABLE RATE OF RETURN DOCKET NO. E-01345A-19-0236 JANUARY 4, 2020

SEIA 4.9: Please provide all analyses in this or previous rate cases that were used to determine the on-peak and off-peak hours/days/months for the residential class. All analyses should be in their original format with formulas intact.

Response: Please refer to the Company's responses to SEIA 3.14 and 3.15 for information about the 3 pm to 8 pm on-peak hours approved in the prior rate case.

Witness: Jessica Hobbick

SOLAR ENERGY INDUSTRIES ASSOCIATION'S FOURTH SET OF DATA REQUESTS TO ARIZONA PUBLIC SERVICE COMPANY REGARDING THE APPLICATION TO APPROVE RATE SCHEDULES DESIGNED TO DEVELOP A JUST AND REASONABLE RATE OF RETURN DOCKET NO. E-01345A-19-0236 JANUARY 4, 2020

SEIA 4.10: Provide 8760 hourly loads for the test year for each residential customer class in the "Initial 1.31_APS19RC00282 (2018-19 Load Research Report)" report. This request should include separate values for Delivered, Site, and Produced values for customer classes that have these load studies. Further, this request should include all data required to transform the raw 8760 data to exactly reproduce the data in each customer class's corresponding load research report.

Response: Please see attachment ExcelAPS19RC00421 for the unadjusted 8760 hourly loads for each residential customer class as outlined in APS's 2018-2019 Load Research Report. This amount is utilized in the Load Research Report where additional adjustments are made. The individual sub class loads are calibrated to the system peak using the values provided below.

Jan	-0.06083
Feb	-0.05490
Mar	-0.05745
Apr	-0.07055
May	-0.07722
Jun	-0.06453
Jul	-0.06557
Aug	-0.05717
Sep	-0.06401
Oct	-0.07826
Nov	-0.04278
Dec	-0.01449

Witness: Leland Snook

Rodney J. Ross
Manager
State Regulatory Affairs

Mail Station 9708
PO Box 53999
Phoenix, Arizona 85072-3999
Tel 602-250-4944
Rodney.Ross@aps.com

February 17, 2020

Court S. Rich
Rose Law Group pc
7144 E. Stetson Drive, Suite 300
Scottsdale, Arizona 85251

RE: SEIA's Fifth Set of Data Requests to
Arizona Public Service Company (APS or Company)
Docket No. E-01345A-19-0236

Dear Mr. Rich:

Arizona Public Service Company's (APS or Company) response to SEIA's Fifth Set of Data Requests in the above docket is available on the APS 2019 Rate Case SharePoint Extranet Site.

Please let me know if you have any questions.

Sincerely,

Rodney J. Ross

RJR/bgs

cc: Hopi Slaughter

SOLAR ENERGY INDUSTRIES ASSOCIATION'S FIFTH SET OF DATA REQUESTS TO ARIZONA PUBLIC SERVICE COMPANY REGARDING THE APPLICATION TO APPROVE RATE SCHEDULES DESIGNED TO DEVELOP A JUST AND REASONABLE RATE OF RETURN DOCKET NO. E-01345A-19-0236 FEBRUARY 6, 2020

SEIA 5.1: Please provide the average number of residential customers that share the following infrastructure on the Company's system:

a) Substation

b) OH Primary Lines

c) OH Secondary Lines

d) UG Primary Lines

e) UG Secondary Lines

f) OH Line Transformers

g) UG Line Transformers

Response:

a) An APS distribution substation on average serves 3,322 residential customers. The number of residential customers served by a specific APS distribution level substation can vary greatly as a result of serving a large service territory with both highly urbanized areas and rural areas.

b) An OH Primary line serves an average of 940 residential customers. Primary voltage is from the substation feeder down to the transformer that turns it to secondary voltage. The number of residential customers served by OH Primary lines can be influenced by many of the same factors that influence the counts associated with substations.

c) APS Secondary lines are responsible for moving electricity from the Over Head Line Transformer to service conductor, which then connects to a residential meter of the customer. See response to part f.

d) An UG Primary line serves an average of 940 residential customers. (APS does not differentiate between Over Head and Underground as some lines can be a combination of OH and UG.) The number of can be influenced by many of the same factors that influence the counts associated with substations. Primary voltage is from the substation feeder down to the transformer that turns it to secondary voltage.

SOLAR ENERGY INDUSTRIES ASSOCIATION'S FIFTH SET OF DATA REQUESTS TO ARIZONA PUBLIC SERVICE COMPANY REGARDING THE APPLICATION TO APPROVE RATE SCHEDULES DESIGNED TO DEVELOP A JUST AND REASONABLE RATE OF RETURN DOCKET NO. E-01345A-19-0236 FEBRUARY 6, 2020

Response to SEIA 5.1 (continued):

e) APS Secondary lines are responsible for moving electricity from the Over Head Line Transformer to service conductor, which then connects to a residential meter of the customer. See response to part g.

f) An OH secondary transformer an average of 5 residential customers. Distribution transformers can vary in size depending on the load which is affected by the number of homes served, the size of home served and various residential consumers characteristics such as the number of air conditioning units or the increased adoption of electric vehicles (EVs).

g) An UG distribution level transformer serves an average of 4 residential customers. Distribution transformers can vary in size depending on the load which is affected by the number of homes served, the size of home served and various residential consumers characteristics such as the number of air conditioning units or the increased adoption of EVs.

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SEIA 5.2: Please provide any diversified demand studies that are used when sizing distribution infrastructure.

Response: APS engineering teams follow standard industry practices, standards, and guidelines developed by leading national and international technical bodies for sizing distribution infrastructure, including the National Fire Protection Association (NFPA) and the National Electric Code (NEC), the American National Standards Institute (ANSI), the Institute for Electrical and Electronics Engineers (IEEE), and the National Electric Safety Code (NESC). In addition, local, regional and national standards and criteria apply. Various examples of application of the guidelines and standards include the following:

- ANSI Standard C84.1 specifies "Electrical Power Systems and Equipment – Voltage Ranges",
- IEEE's NESC specifies "standards for the safe installation, operation, and maintenance of electric power and communication utility systems including power substations, power and communication overhead lines, and power and communication underground lines".
- IEEE Standard 3001.2 provides "Recommended Practice for Evaluating the Electrical Service Requirements of Industrial and Commercial Power Systems" at the premise level, and
- NFPA's Article 430 provide guidance on safely and effectively sizing distribution equipment and infrastructure at the premise level.

APS's Distribution Planning and Engineering teams facilitate new customer interconnection requests for load or generation to the distribution infrastructure in accordance with industry standards and practice. The distribution infrastructure must furnish acceptable levels of reliability, acceptable voltage and power quality, must dependably and quickly detect and isolate faulted equipment, and must be safely operated in the public domain. Technical engineering analyses drive project scope and ensures all aspects of thermal, voltage, protection and public safety can be achieved.

APS Engineering teams utilize feeder historical demand data which accounts for Distributed Generation reducing system load (net-load peak) for sizing distribution infrastructure when planning the system. This historical demand data is measured at the circuit level, and, therefore, captures diversified demand for both load and generation at the circuit level. Net-load peaks may be compared to calculated demand without Distributed Generation (gross load peak)

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Response to SEIA 5.2 (continued):

to ensure that system loading remains within emergency limits when solar intermittency or abnormal operations conditions are experienced. This process takes into account PV contribution at peak, but also addresses risk if PV does not appear.

Additionally, prior APS investments in Advanced Metering Infrastructure (AMI) provide customer interval load and solar production information that is used to determine a customer's non-coincident demand peak (when an individual customer experiences a load peak) differentiated from: (a) a customer's demand at the time of circuit peak, (b) the substation transformer peak, or (c) the total system demand peak; additionally, historical load values are inclusive of behind-the-meter distributed energy resource production that coincides with premise, circuit and transformer demand.

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SEIA 5.3: Please refer to the direct testimony of Leland R. Snook at 12, which states:

> Distribution plant, unlike production and transmission plant, is generally designed to meet a customer class's peak load, which may or may not coincide with the system peak load. Thus, costs related to distribution substations and primary distribution lines are allocated based on NCP loads. Allocation of costs related to distribution transformers and secondary distribution lines are based on the summation of the individual peak loads or demands of all customers within a particular customer class (Sum of Individual Max). Each of these allocation methods has traditionally been used by APS and accepted by the Commission for many years.

a) Does the Company size distribution transformers and secondary distribution lines to the sum of the individual max of the customers served by those assets, or does it size them to the diversified demand of the customers served by those assets?

b) Notwithstanding the fact that the allocation of costs of distribution transformers and secondary distribution lines based on the sum of individual max allocator has been traditionally used by APS and accepted by the Commission for many years, does the Company believe that this allocator is the best allocator to use for these costs? If so, please indicate why.

c) Would the Company consider using the class NCP instead of the sum of individual max allocator for allocating the cost of distribution transformers and secondary distribution lines? If not, please provide an economic/policy reason other than an historical continuity argument.

Response:

a. The Company typically sizes the distribution transformer and secondary service based on the connected load of the homes served by a transformer, which can be estimated by such factors as service panel size, square footage, and other relevant factors. The estimate includes load diversity among the individual homes served by the transformer. Equipment for homes with rooftop solar is typically sized according to the site load because the capacity has to be sufficient to serve the customer on days or at times when the rooftop solar system is not generating because of weather or other conditions. In addition, the equipment comes in standard

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Response to SEIA 5.3 (continued):

sizes such as 50 kVA or 75 kVA.

b. Yes. It best represents the driver for these costs.

c. No. The Class NCP would not appropriately reflect the cost driver for distribution transformers and secondary lines because these assets are not shared across a wide group of residential customers. Unused capacity for a distribution transformer serving one home cannot be used to remedy a capacity shortage on another transformer.

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SEIA 5.4: Please refer to the NARUC Manual on Distributed Energy Rate Design and Compensation, at page 111, (available at https://pubs.naruc.org/pub/19FDF48BAA57-5160-DBA1-BE2E9C2F7EA0) which states:

Use of non-coincidental peak methods in determining an individual customer's appropriate share of demand charges is functionally problematic. Noncoincidental peak usage does not correlate with how the system is designed, and costs are incurred, as the system needs to be designed for peak usage. In other words, if a customer's peak demand occurs in non-peak hours, there is likely plenty of available capacity, which has little economic impact on the utility's costs to serve that demand.

a) Does the Company agree with the statement above? Please explain your response.

b) While the statement above is discussing rate design options that charge individual customers based on their individual demand, does the Company believe that the argument regarding the alignment of individual demand and utility costs also applies to the cost allocation process for customer classes? Please explain your response.

Response:

a. No. While the Company generally uses a CP approach for residential demand rates, where the demand charges are only applied to on-peak hours, there are some costs such as distribution transformers and secondary service equipment, that are driven by customer loads whenever they occur. APS notes that the NARUC manual referred to above specifically states that the manual attempts to provide regulators ad stakeholders with information on how to address opportunities, and that the options discussed in the manual re not the only ones available to a jurisdiction.

b. Not necessarily. Different types of capacity costs have different cost drivers and therefore should be allocated differently. There is no one-size-fits-all method that would accurately reflect all types of costs. For example, "system" costs that are designed to serve the peak demand of all customers, such as generation and transmission costs, should be allocated based on a coincident peak (CP) allocator (such as 4-CP for the core summer months, or average-and-excess which is a combination of CP and average energy). However, capacity costs that are designed

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Response to SEIA 5.4 (continued):	to serve a few customers, such as distribution transformers, should reflect the demands of those customers whenever they occur.

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SEIA 5.5: Please refer to the Company's present and proposed R-TOU-E, R-2, R-3, and RTech tariffs, workpaper JEH-WP1DR (Proof of Revenue), workpaper LRS_WP4DR (Development of Allocation Factors Report) and Initial 1.31_APS19RC00282 (2018-19 Load Research Report).

a) Confirm, separately, whether the present and proposed R-TOU-E, R-2, R-3, and R-Tech tariffs were designed to be revenue-neutral with respect to the entire residential class. If they were not, please explain if revenue neutrality was incorporated into the tariff designs.

b) The R-2 and R-3 tariffs collect distribution revenues in part through on-peak demand charges and do not have off-peak demand charges. However, some distribution costs were allocated to these classes based on non-peak demand charges (for instance, all costs based on the sum of individual max (which are necessarily untimed); and in some cases the class NCP occurred during nonpeak hours, such as with the combined R-2 and R-3 class (R-Solar (Demand)). Does the Company see any conflict between allocating costs based in part on off-peak demand values, but collecting revenue through on-peak demand charges?

c) What principles guided the Company when determining what fraction of demand-based distribution costs were collected through volumetric per kWh rates? How did the Company apply these principles differently for the RTOU-E, R-2, R-3, and R-Tech tariffs?

d) The R-Tech tariff had only 29 customers as of the end of the test year, yet the Company has authorization to allow 10,000 customers on this tariff since its approval in August 2017. Why does the Company feel that customer adoption to this rate has been particularly slow? Does the Company plan to make any changes to this tariff to increase customer adoption?

Response: a) No. In the prior rate case, the new rates were calibrated with the revenue from their most similar old rate and then the resulting revenue from all rates was calibrated to the revenue target for the entire residential class. For example, Rate Schedule TOU-E was calibrated to the revenue of the existing time-of-use energy rates, and Rate Schedules R-2 and R-3 were calibrated to the existing demand rates. The R-Tech rate was negotiated and, therefore, not specifically

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Response to SEIA 5.5 (continued):

tied to any rate class. However, it was generally checked against Rate R-3 for reasonableness. In the current rate case, the proposed charges were designed to meet revenue targets for each rate.

b) No. Please refer to the Company's response to SEIA 4.8.d.

c) Ideally, the unbundled delivery costs would be entirely recovered through a demand charge or a combination of demand and monthly service charges, in order to fully reflect the drivers for these capacity costs. However, for customer impact considerations, a portion of these costs are recovered through energy charges to limit the overall bundled demand charge. The delivery charges are the same for R-2 and R-3. R-tech recovers a higher percentage of delivery costs through demand charges. TOU-E does not have demand charges.

d) While not definitively known at this time, the low participation to date could have several causes including the attractiveness of Rate Schedule TOU-E to solar customers, low adoption of residential battery storage, or the requirement to purchase new technologies, among other potential reasons. The Company is monitoring customer participation in this rate as part of the pilot program and may propose to modify or discontinue this rate in a future proceeding.

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SEIA 5.6: Please refer to the Company's proposed R-TOU-E, R-2, and R-3 tariffs and workpaper JEH-WP1DR Proof of Revenue.

a) Which of these three tariffs does the Company feel best reflects cost-causation principles?

b) Would the Company feel that a tariff that exactly translates cost allocation factors to a rate design (e.g. a tariff in which customer, on-peak and off-peak energy, CP, NCP, and Ind Max demand costs are mapped exactly to tariff components based on an individual's energy and demand characteristics) be appropriate? If so, please indicate why the customer has not proposed such a rate. If not, please indicate why.

c) In the "TY kWh,Rev,Cust" tab, do the kWh billed figures use the "site" or "delivered" kWh for the solar customers within the three tariffs?

d) In the "TY kWh,Rev,Cust" tab, is the "kWh unbilled" values related in any way to the difference between "site" and "delivered" for solar customers within these tariffs? If so, please explain if the difference is wholly attributable to this difference.

e) Confirm that solar customers on the R-2 and R-3 tariffs do not have a grid access charge, but solar customers on the R-TOU-E tariff do have a Grid Access Charge.

f) Confirm that in JEH-WP1DR, the total cost allocated to the R-TOU-E customer class is recovered through the kWh and customer billing determinants, and none is recovered through the Grid Access Charge line item. If deny, please indicate where in the Proof of Revenue workpaper the costs recovered through the Grid Access Charge line item.

g) How much does the Company project it will collect annually through the Grid Access Charge?

h) Where is the revenue from the Grid Access Charge accounted for in the Proof of Revenue workpaper or COSS workpaper?

i) It appears that the billing determinants in the Proof of Revenue workpaper are based on the "delivered" kWh from solar customers plus the "no solar" kWh for the R-TOU-E load study. Assuming this is the case, and given that the

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SEIA 5.6 (continued): Company will recover the entire revenue requirement from the R-TOU-E class based on the delivered energy, explain how revenue collected through the Grid Access Charge is not in excess of the costs allocated to the R-TOU-E customer class?

Response:

a) Each of these rates are designed to recover the costs allocated to that class, and reflect cost causation principles. However, Rate Schedule R-3 has best alignment of charge types with cost drivers because it recovers more of the demand-related capacity costs through demand charges.

b) No. This would require a separate rate for each residential customer, which would not be practical.

c) Delivered.

d) No. The term "unbilled" refers to accrual adjustments for the Test Year.

e) Correct. Rates R-2 and R-3 do not have a grid access charge because they recover a portion of their capacity costs through demand charges.

f) Correct. The Grid Access Charge revenue is credited against the revenue requirement for the LFCR Adjustor Rate, which is not part of base rates. Therefore, it is not included in the proof-of-revenue in this proceeding. The associated costs are also removed from the cost-of-service-study.

g) The Company does not project revenue collected through the Grid Access Charge. The Test Year revenue was approximately $734 k.

h) Please see part f.

i) Please see part f.

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SEIA 5.7: Refer to LRS_WP11DR Cost of Service Study Model. The model does not appear to carry through changes in certain values through the full workpaper.

a) If one changes the Cost of Common Equity in the "Control" tab, it does not affect the Base Revenue from Rates in row 33 or the Income Tax in row 46 of the "Cost of Service" tab, which are derived from values in rows 1-1505. However, it does impact the value of the Total Revenue Requirement (Including Fair Value Increase) in row 56, which is derived from rows 1513 through 1750. Is this the expected result from changing this value?

b) If one changes the Cost of Common Equity in the "Control" tab from 10.15% (the default) to 5%, the total operating revenues in row 37 remains the same at $3,500,827,080. However, the Total Revenue Requirement (Including Fair Value Increase) falls to $3,098,394,197. Is this the expected result from changing this value?

c) If one changes the Cost of Common Equity in the "Control" tab from 10.15% (the default) to 5%, the Base Revenues from Rates in row 33 remains the same at $3,339,310,868. However, the Total Revenue Requirement in row 1655 (which does incorporate the lower return on equity but does not include the Fair Value Increment) falls to $3,052,751,669. Is this the expected result from changing this value?

d) When changing the DEMPROD1 allocator in cell H10356 of the "Import" tab from 0.0041 to 0.1, the values for the Development of Rate Base and Operating Expenses in rows 13-30 and 39-48 of the "Cost of Service" tab change based on the updated allocation of production costs for the R-Solar (TOU) class. Further, the Production Revenue Requirement values in rows 1517-1522 and Total Return on Rate Base in row 1559 also change based on the new allocation. However, the Development of Return values in rows 32-37 of the "Cost of Service" tab do not change. Is this expected result from changing this allocator?

e) The above issues appear to be related to the fact that the Base Revenues in rows 701-707 in the "Cost of Service" tab are ultimately based on imported, hard-coded values from rows 4500-5500 of the "Import" tab, which is pulled from an external file entitled "15_Retail Revenue 2018-2019.xls" and not derived from the values in the COSS itself. Confirm whether this is the root cause of the values in the top

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SEIA 5.7 (continued): portion of the "Cost of Service" tab not updating when value such as the cost of equity and demand production allocators are changed. If not, please provide the root cause.

f) Provide the original "15_Retail Revenue 2018-2019.xls" referenced in the COSS.

g) Given the behavior noted above, can one use the COSS to analyze the impact of changing key values such as the cost of equity or customer-class allocators? If so, please indicate which values should be considered and which values ignored. If not, please provide an updated COSS that allows for this analysis.

Response:

a. Yes. The Base Revenue and Income Tax references are test year actuals that would not be affected by a change in the Cost of Common Equity. However, the impact can be observed in the Total Revenue Requirement section which includes a return on rate base component.

b. Yes, for similar reasons explained in the response to part a.

c. Yes, please refer to the response to part a.

d. While rows 32-34 and rows 36-37 will not change when the DEMPROD-1 allocator changes (because those calculations do not include the DEMPROD-1 allocator), row 35 will change because it is impacted by the DEMPROD-1 allocator. Additional detail is provided in Column H in the "Cost of Service" tab. Furthermore, when changing an allocator for a particular class, other classes need to be adjusted so that the total allocation equals 100%.

e. No. Please refer to the response to part a.

f. Please refer to the Company's response to SEIA 2.6.a.

g. Yes. The model will show the change in revenue requirements resulting from changing key parameters or allocators. Please see the responses to parts a through e.

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SEIA 5.8: If an Intervenor desires to create a new residential rate design using the Company's workpapers based on the "delivered" load study values instead of the "site" load study values for a particular customer class, please indicate with specificity what steps would be required to ensure an accurate result. This request should include directions for manipulating values in the various Company workpapers such as the COSS and Proof of Revenue.

Response: The Company's current and proposed billing determinants in the Proof of Revenue use "delivered" load. A new rate can be developed using the proof-of-revenue model, workpaper JEH-WP1DR, by (1) picking a rate tab that is most similar to, or will be replaced by, the new rate; (2) changing the billing determinants to correspond to the new rate design; and (3) setting the charges to produce the same amount of proposed revenue as the original rate.

Witness: Leland Snook

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SEIA 5.9: If an Intervenor desires to create a new residential rate design using the Company's workpapers based on a different set of peak and off peak hours for a particular customer class, please indicate with specificity what steps would be required to ensure an accurate result. This request should include directions for manipulating values in the various Company workpapers such as the COSS and Proof of Revenue. If any data is needed to complete this new rate design that has not already been provided in this docket, please produce such data.

Response: Please refer to the response to 5.8.

Witness: Jessica Hobbick

Rodney J. Ross
Manager
State Regulatory Affairs

Mail Station 9708
PO Box 53999
Phoenix, Arizona 85072-3999
Tel 602-250-4944
Rodney.Ross@aps.com

February 24, 2020

Court S. Rich
Rose Law Group pc
7144 E. Stetson Drive, Suite 300
Scottsdale, Arizona 85251

RE: SEIA's Seventh Set of Data Requests to
Arizona Public Service Company (APS or Company)
Docket No. E-01345A-19-0236

Dear Mr. Rich:

Arizona Public Service Company's (APS or Company) response to SEIA's Seventh Set of Data Requests in the above docket is available on the APS 2019 Rate Case SharePoint Extranet Site. Please note that the attachment in response to Question 7.8 is Highly Confidential and is being provided pursuant to an executed Protective Agreement.

Please let me know if you have any questions.

Sincerely,

Rodney J. Ross

RJR/bgs

cc: Hopi Slaughter

SOLAR ENERGY INDUSTRIES ASSOCIATION'S SEVENTH SET OF DATA REQUESTS TO ARIZONA PUBLIC SERVICE COMPANY REGARDING THE APPLICATION TO APPROVE RATE SCHEDULES DESIGNED TO DEVELOP A JUST AND REASONABLE RATE OF RETURN DOCKET NO. E-01345A-19-0236 FEBRUARY 12, 2020

SEIA 7.1: Please refer to the Company's response to SEIA 2.7.

a) How is data from the generator production meter used when billing solar customers?

b) Is it possible for the Company to bill solar customers without having a generator production meter in place?

c) Is the data from the generation production meter used for purposes other than billing customers? If so, please describe each instance of its use in detail.

d) Are the Company's standard residential AMI meters capable of being configured for bi-directional use? If so, why does the Company purchase separate meters for this purpose?

e) Are residential non-solar customers who switch to a more complex rate (such as a TOU or demand rate) charged more or allocated more costs in the COSS for metering costs than residential customers on flat billing rates?

f) The Elster model REX-R2SD does not appear to be a current product offering. Is this the same model as the REX2 listed here? https://www.elstersolutions.com/en/product-details-na/826/en/REX2_meter If not, please provide the meter documentation and specifications for the REXR2SD.

g) Is the REX-R2SD used for all residential rate classes? Is it used for both bidirectional billing metering for solar customers and for generation production meters for solar customers?

h) If the Company uses other typical models aside from the REX-R2SD for bidirectional billing metering for solar customers and for generation production meters for solar customers, please provide those models.

i) Why does the Production meter cost substantially less than the Standard meter?

j) What is included in the cost category "Shop Cost"?

k) How long does it take to install a "standard" meter?

l) How long does it take to install a "bi-directional" meter?

Witness: Leland Snook

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SEIA 7.1 (continued):

m) How are costs for installation labor determined? Are they based on the actual time it takes to install the meter, or on some other allocator such as meter cost?

n) Confirm that the meter costs listed in SEIA 2.6d are actual costs from the Company's vendor for these units. If they are anything other than this cost, please indicate how these costs were determined.

Response:

a) Generation production meter data is not used in billing.

b) Yes.

c) Yes. As noted in the Company's response to SEIA 7.1 a, data from the production meter is not used for billing. However, it is used to determine performance-based incentives for solar customers, to study and monitor the grid impacts from distributed solar, to calculate the Company's Lost Fixed Cost Recovery adjustment, to calculate cost of service, and to track compliance with regulatory mandates. In addition, the Commission requires APS to utilize production meters for compliance purposes. Please see Decision No. 72737 (January 18, 2012).

d) A new standard meter has such capability. However, the existing standard meters deployed in the field are not capable of supporting bi-directional for all of the Company's types of rates and, therefore, are not used for that purpose.

e) No, because the different rates do not require a different meter type. The cost allocation for meters is provided in workpaper LRS_WP4DR. The monthly service charges vary by rate class. See workpaper JEH_WP1DR.

f) Yes.

g) It is used in all rate classes, but not for bi-directional metering. It is used for the peoduction meter, but without the remote disconnect switch, which makes it less expensive than the standard meter.

h) APS uses the following meters for residential customers:

Residential: Honeywell REX2, Honeywell A3-ILN, Landis+Gyr Focus AXe

Witness: Leland Snook

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Response to SEIA 7.1 (continued):

Residential Bi-Directional: Honeywell A3-ILN, Landis+Gyr Focus AXe, Landis+Gyr S4x

Residential Solar Production: Honeywell REX2, Landis+Gyr Focus AXe

i) Refer to part g.

j) The "shop cost" is based on the actual employee classification and time involved to complete preparing and testing the meters.

k) For self-contained meters it takes approximately 10 minutes excluding travel to exchange the meter.

l) Installation of a bi-directional meter is the same as a standard meter, except that typically APS would also set the additional production meter during the same visit.

m) Installation costs are determined by the job classification and the time it takes to perform the work.

n) Yes.

Witness: Leland Snook

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SEIA 7.2: Please refer to the Company's response to SEIA 3.4.

a) Why were different values used for the DG capacity in the Company's 2019 BTA Ten-year Transmission System Plan and workpaper BJA-WP1DR?

b) Please provide all models and data that were used to produce the analysis in 3.4a. This should include the relationship between historical GHI and DG production on the APS system.

c) How does the Company collect or acquire historical GHI data for its system?

Response:

a) The 2019 Ten Year Plan and BJA-WP1DR were prepared at different times. BJA-WP1DR was prepared at a later date, and it used the most current forecast available.

b) Models and data used to develop the hourly DE loads referenced in SEIA 3.4 are provided in the attached files ExcelAPS19RC00458 and ExcelAPS19RC00459. Please note that the hourly forecast contains new DG production starting in 2016, and the 2019 Ten Year Transmission Plan showed new DG beginning in 2020.

c) APS obtains the GHI data from the National Renewable Energy Laboratory (NREL).

Witness: Brad Albert

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SEIA 7.3: Please refer to the Company's response to SEIA 3.6d.

a) What is the Company's best guess for the cause of the decrease in residential customers counts from March to June and the increase between July and December?

b) Does the Company allow customers to put their accounts on hiatus, or to deactivate and reactivate their accounts if they are out of their residence for an extended time?

Response:

a) The Company does not have any specific data regarding the cause of the referenced decrease in residential customer counts. However, seasonal customers and students could contribute to this effect.

b) Yes. Customers may turn off service and turn on service at their discretion.

Witness: Leland Snook

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SEIA 7.4: Please refer to the Company's response to SEIA 3.10. Does the Company have an estimate on when the July through December 2019 load data will be available?

Response: APS estimates that this will information will be available in April.

Witness: Leland Snook

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SEIA 7.5: Please refer to Company's 2020-2029 Ten Year Transmission System Plan dated January 31, 2020.

a) What were the primary causes for the delay of the in-service date for projects listed on page 7?

b) The Company lists delays in four projects from the 2019-2028 plan and no new projects from the June 2019 Supplemental filing to the 2019-2028 plan. Does the Company believe that the near-term slowdown in transmission upgrades is indicative of any larger trends? If so, what are those trends?

c) On page 8 of the report, the Company discusses a potential 500 kV transmission line to support growth in the west and southwest parts of the Phoenix metropolitan area. Has the Company performed, or does the Company expect to perform, any studies of non-wires alternatives such as distributed generation, energy efficiency, or demand response, that might be able to reduce or delay the need for new high-voltage transmission infrastructure? If no, please explain why.

d) Please provide the EE "impact to peak" MW, DG "impact to peak" MW, and DG nameplate assumptions for the years 2020 through 2029. To the extent that values from corresponding years differ from the Company's 2019-2028 Ten Year Transmission System Plan, please explain what drove the changes in values.

Response:

a) The transformer additions and in-service dates are customer-specific and dependent on customer needs.

b) No, APS filed a June 2019 Supplemental Transmission Plan for 2019-2028 which reflected new projects confirmed during the first half of 2019. As such, those projects were no longer considered new projects for purposes of filing the 2020 Plan. Also see APS's response to SEIA 7.5a. Additionally over the past few years the Company placed into service multiple Extra High Voltage projects in the areas with significant forecasted growth. Since the Company recently completed some major transmission projects, this

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planning cycle does not contain any major new transmission projects. This is not indicative of any larger trend.

Response to SEIA 7.5 (continued):

c) APS expects to perform extensive study work to meet the demand requirements of the rapidly growing western and south-western parts of Phoenix metropolitan area. As part of the study work, various non-wires solutions including battery energy storage options would be evaluated and compared with traditional wires solutions. APS would look for the least cost best fit solution to reliably meet its native load needs.

d) The table below contains the MW amounts of EE and DE included in Attachment C of the 2019 and 2020 Ten Year Plans. Both the 2019 and 2020 Plans were based on the same EE and DE forecast. As a result, the difference relates to the different reporting periods.

		2019 Ten Year Transmission Plan				2020 Ten Year Transmission Plan		
		Impact to Peak		Name plate		Impact to Peak		Name plate
Year		EE	DE	DE		EE	DE	DE
2019		100	11	180				
2020		199	22	360		99	11	180
2021		250	32	540		151	21	360
2022		294	45	767		194	34	587
2023		337	58	1017		237	47	837
2024		380	71	1279		280	60	1099
2025		423	84	1538		323	73	1358
2026		466	97	1797		366	86	1617
2027		509	108	2053		409	97	1873
2028		552	119	2298		452	108	2118
2029						495	119	2347

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SEIA 7.6: Please refer to the Company's response to SEIA 3.9.

a) Where are the sites of the projects that are in the "Company Contracted Solar" category?

b) Please provide a breakdown of MW per year by project type (e.g. small rooftop, large rooftop, fixed-tilt ground mount, tracker ground mount, etc.) for the Company Owned solar.

c) Does the contract for "Company Contracted Solar" include the full output of contracted systems? If not, please indicate how the contract is structured.

d) If the answer to a) is yes, please explain the sizable relative difference in the monthly production.

Response:

a) Sites included in "Company Contracted Solar" are as follows:
Ajo - Ajo, AZ
Solana - Gila Bend, AZ
Desert Sky (Badger) - Tonopah, AZ
Sun E AZ 1 - Prescott, AZ
Saddle Mountain - Tonopah, AZ
Gillepsie – Buckeye, AZ

b) Please see attached file APS19RC00592.

c) Yes.

d) Generation by APS's contracted solar systems is predominantly driven by output of a single plant - the Solana Generating Station, which varies month to month due to operating characteristics.

Witness: Brad Albert

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SEIA 7.7: Please provide the total MWAC of solar generation on the Company's grid for each month between 2016 and 2019, broken down by:

a) Residential rooftop solar

b) Non-residential rooftop solar

c) Company-owned solar

d) Company-contracted solar

Response: Please see attached file APS19RC00593.

Witness: Brad J. Albert

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SEIA 7.8: Please refer to the Company's response to SEIA 3.14, attachment SEIA 3.14_APS19RC00391_Miessner Settlement Rebuttal 16-0036, which states on page 10 that a "cost basis for the TOU rate … would warrant the on-peak period to be 3 PM to 9 PM".

a) Is Figure 2 on page 12 of this same document the only support for this statement? If not, please provide additional support for this statement.

b) Was there a specific metric (e.g. hours within 10% of peak load) that the Company used when evaluating the peak period?

c) Please provide the original workpapers that were used to create Figure 2 on page 12. This request is seeking not only the values shown in the figure, but also workpapers used to calculate those values. All workpapers should be in their original format with formulas intact.

d) Mr. Miessner noted that SWEEP did not "offer any evidence to adopt" its preferred TOU time periods and thus recommends its proposals not be adopted. If an intervenor did present evidence that the Company's current TOU periods were suboptimal and should be adjusted to better reflect the Company's load, would the Company consider changing the TOU periods?

Response:

a) No. The statement was based on the entire discussion and attachments provided in response to SEIA 3.14. Additional detail for the load and cost studies are provided in the attached spreadsheet ExcelAPS19RC00628. This information is Highly Confidential and is being provided pursuant to an executed Protective Agreement.

b) The Company assessed the highest 90 load hours in June through September where the load was within 10% of the peak value. In addition, the hour directly following the proposed end of the on-peak period was assessed to see if potential load shifting could increase the load in this hour to a high level. The Company then checked the highest 150 hours in these months to see how robust the 90-hour evaluation was. Next the annual hourly incremental cost was evaluated. Both the load and costs assessments supported summer on-peak hours of 3 to 9 pm.

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Response to SEIA 7.8 (continued):

c) Please see APS's response to SEIA 7.8 a.

d) The Company does not support changing the on-peak hours in this proceeding. The 3 pm to 8 pm summer on-peak period was and is fully supported and is consistent with APS's system peak. In addition, time-of-use hours must be stable over time so customers can learn about and rely on the rates as they change behavior and invest in home technologies to help them respond to the rates and save on their bill. For example, the previous time-of-use hours were in place for over 10 years.

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SEIA 7.9: Please refer to the Company's response to SEIA 3.14, attachment SEIA 3.14_APS19RC00394_Heat Maps. Please provide the original workpapers that were used to create the figures in this attachment. This request is seeking not only the values shown in the figures, but also workpapers used to calculate those values. All workpapers should be in their original format with formulas intact.

Response: Please see the Company's response to SEIA 7.8 parts a and c.

Witness: Jessica Hobbick

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SEIA 7.10: Please refer to the Company's response to SEIA 3.14, attachment SEIA 3.14_APS19RC00390_Miessner Direct Testimony 16-0036. On page 27 to 30, Mr. Miessner discusses the Company's demand measurement proposal, including limiting billing demand to a 15% load factor equivalent value.

a) Confirm that the Company's current and proposed tariffs utilize the demand measurement proposal discussed in this attachment. If not, please indicate what the current measurement methodology is.

b) For customers on a demand rate in 2017 through 2019, inclusive, please provide the monthly number of customer bills and percentage of customer bills in which the demand limiter was utilized. Please also provide the average reduction from the measured billing demand to the demand limited billing demand for each month.

c) The testimony states "This demand limiter will not be applicable to partial requirements customers with on-site generation." Why was the demand limited not extended to partial requirements customers with on-site generation?

d) Given that the Company requires metering that allows the Company to determine the "gross" or "site" usage for a partial requirements customer, could the Company implement a demand limiter that is based on a 15% load factor equivalent for the "gross" or "site" usage for a partial requirements customer?

e) Would the Company consider implementing a demand limited discussed in c) above for partial requirements customers? If not, why not?

f) Please provide additional data and/or reports that were generated as part of the Flagstaff Solar Experiment discussed on page 42.

Response: a) The current and proposed residential Rates R-2 and R-3 have this provision for full requirements customers.

b) The Company has not performed this specific analysis. The monthly billing demand and energy information provided in the response to SEIA 2.3 could be used to obtain an upper estimate of this value.

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Response to SEIA 7.10 (Continued):

c) The demand limiter was designed in case a customer occasionally sets an unusually high demand, relative to their energy usage, in a particular month. It was not meant for solar customers who typically set a high demand relative to their energy usage in every month.

d) The Company does not calculate the bills of residential solar customers based on the site load. Therefore, it would be inconsistent to reduce a billed amount by a calculation based on the site load.

e) No. See parts c and d.

f) Along with other entities, APS won a US Department of Energy – DOE Solar Energy Technologies Program's High Penetration Solar Deployment award to demonstrate and study high photovoltaic penetration. As part of the Company's approved Flagstaff Community Power Project (Project), APS developed, constructed and managed a high penetration of distributed photovoltaic generation in Flagstaff, Arizona. At the conclusion of Phase 1 of the DOE study, the DOE issued a technical report which can be found here:
https://www.osti.gov/servlets/purl/1025589
A Phase 1 update authored by the National Renewable Energy Laboratory (NREL, one of the Company's partners in the DOE study) can be found here:
https://www.nrel.gov/docs/fy12osti/54110.pdf
The DOE technical report on Phases 2 through 5 of the study can be found here:
https://www.osti.gov/servlets/purl/1171386

In addition, APS was required to report on the progress of the Flagstaff Project in its annual Renewable Energy Standard compliance reports until its completion. Those reports can be found here:
https://docket.images.azcc.gov/0000124264.pdf
https://docket.images.azcc.gov/0000135558.pdf
https://docket.images.azcc.gov/0000143938.pdf
https://docket.images.azcc.gov/0000152762.pdf

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SEIA 7.11: Please provide the 8760 hourly data of solar production for 2016-2019, inclusive, broken down by:

a) Residential rooftop solar

b) Non-residential rooftop solar

c) Company-owned solar

d) Company-contracted solar

Response: APS is compiling the requested data and will provide it as soon as it is available.

Witness: Brad Albert

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SEIA 7.12: Please refer to the Company's response to SEIA 2.6b.

a) Would the COSS produce the same mathematical result for total costs allocated under the Company's methodology (allocation based on Site load and then crediting for the difference between the Site and Delivered) and if the Company had allocated costs based on the Delivered load alone? If it would not, please explain why it would not and what cost categories would be different between the two methodologies.

b) Is it the Company's position that in crediting solar customers for the difference between their Site load and Delivered load that it is crediting back the costs that would be avoided by exported solar energy? If not, please explain in concept what the credit is for.

c) Would allocating costs based only on the Delivered component of the solar customer's use also "allocate[] capacity and energy costs to solar customers based on what APS has to provide"? If not, please explain why. If so, why does the Company not allocate costs this way?

d) Explain in detail how the Company's analytical approach also captures the cost of providing grid services for the rooftop solar customer's export of energy and backup of the customer's self-supplied generation, including support for the starting of motors (e.g. the in-rush current associated with the starting of an air conditioning unit, which generally cannot be met by a solar array).

e) Please indicate where in the COSS customers are allocated costs specific to the "in-rush current" grid service.

f) What allocators are used for costs associated with the "in-rush current" grid service costs?

g) How does the Company track when it has provided the "in-rush current" grid service to solar and non-solar customers?

h) Please indicate where in the COSS customers are allocated costs specifically for maintaining distribution voltage within the required operating limits.

i) What grid services and/or assets are required to handle the

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SEIA 7.12 (continued): export of solar energy from residential customers to the grid that are also not required to handle the delivery of energy from the grid to residential customers?

Response:

a) No. Please see the Company's response to SEIA 6.2.c.

b) No. It is a credit for the entire solar generation – both the export power and the self-consumed power.

c) No. Please see APS's response to SEIA 7.12.d.

d) No. The extra costs for grid services and back-up services are captured by using site load for the initial starting cost allocation. If the allocation started with delivered load these extra costs would have to be added back in to the final cost allocation. The extra grid cost created by rooftop solar for the export power, in terms of two-way power flow, distribution feeder capacity and planning, and any other related issues are not captured by the current site load/credit approach.

e) This is not a specific allocated amount. However, the costs would generally be included in the demand-related components for the generating plants and the grid.

f) Please see part e.

g) Please see the Company's response to SEIA 7.12.e.

h) This is not a specific category, but rather included in distribution primary and substation costs.

i) APS has a commitment to maintain system voltage at the Point of Delivery (POD) in accordance with ANSI C84.1 as noted in the Arizona Administrative Code R14-2-208F. Solar customers in areas with high solar adoption have the potential to cause high voltage during the Spring and Fall months. APS has an obligation to maintain voltage, and installing or upgrading traditional equipment such as reconductoring, feeder additions, transformer upgrades, capacitor banks and voltage regulators are some options available to APS. These standard equipment types are installed to maintain system reliability for residential and C&I customers as well, however the application and need for such upgrades and additions may be different on feeders

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Response to SEIA 7.12 (continued):

with high penetration of solar.

Activating advanced grid support features available with Advanced Inverters provide more options to minimize the solar customer's impact to the APS System from a system reliability perspective. On APS's system, as with best industry practice, all generating facilities (DER systems) shall maintain voltage at the point of delivery in accordance with ANSI C84.1 as noted within Section 8.4 of the APS Interconnection Requirements Manual. Lastly, all new generating facilities using static inverter technology are required to install inverters capable of meeting IEEE 1547-2018 standards as required in the pending ACC DG Interconnection Rules and also Section 8.7(A)(11) and 8.7(A)(12) of the APS Interconnection Requirements Manual.

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SEIA 7.13: Please refer to SEIA 2.3_APS19RC00343_Residential Data.

a) Please provide a description of what data is in each column and a description of each value in the "rider_group" column to the rate classes in the Load Study workpapers.

b) Please indicate how solar and non-solar customers and values are distinguished in the data.

Response:

a) The description of data in each column is as follows:

RATE – Represents the residential electric rate.
MTH – Represents the residential billing month.
Kwh – Represents amount of kWh billed.
kw_on – Billed KW.
rider_group – Identifies rate riders as identifed:

1. AMI-OUT – AMI opt-out
2. E-3 – Low income discount
3. E-4 – Medical care equipment support program
4. LFCR-OUT – LFCR opt-out – currently inactive
5. EPR2-RDR – EPR-2 (Partial requirements/Solar)
6. EPR6-RDR – EPR-6 (Partial Requirements/Solar)
7. RCP-RDR – RCP (Partial Requirements – Solar)

Season – Rates vary by summer and winter seasons. The summer season is the May through October and the winter season is the November through April.
Customer_ID – Unique customer identifier (added in response to SEIA 8.1)

b) Solar customers can be distinguished by groups containing the following riders:

1. EPR2-RDR
2. EPR6-RDR
3. RCP-RDR

Witness: Jessica Hobbick

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SEIA 7.14: Note – the ELCC questions below are on a confidential attachment.

Please refer to the Company's response to SEIA 1.14, attachment SEIA 1.14_ExcelAPS19RC00313_ELCC-Generation_CONF.

a) Confirm that the data on the Renewables tab includes both utility-scale (i.e. non-rooftop) wind and solar renewable production. If not, please indicate what it represents.

b) Provide the nameplate (MWDC) and inverter (MWAC) capacity of utility scale wind, utility scale solar, and rooftop solar that was assumed for 2020 through 2024, inclusive. Also include the values assumed for the 2018 and 2019 rooftop solar that were used to determine the incremental value over 2018.

c) Please indicate what customer class(es) from the Company's Load Reports were used in the data in the "Solar Customer Data" tab.

d) The total generation on the Renewables tab falls slightly between 2019 and 2022 (~0.2% per year), and then more steeply between 2022 and 2024 (~2.25% per year). What causes this reduction in the forecast for renewable generation?

e) Based on the decline in total generation in the Renewables tab between 2019 and 2024, it does not appear that the Company is adding any new utility-scale renewable capacity in this forecast. Is this the case, and is this consistent with the Company's IRPs or announced plans?

f) In the 12x24 tab, it appears that many cells in the Production and Export tables were manually set to "0" rather than use the formula based on the meter readings used in the rest of the cells. Why were these manual adjustments made?

g) Please indicate how the DG production values in the DG tab were created for each year. Please include in this discussion how or if historical data was used, how or if modeled data was used, what is the source of inter-year daily variation in specific production (i.e. production normalized for the annual increase in DG MW), and whether and how the same base assumptions were used to create generation profiles in multiple years.

Witness: Brad Albert

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SEIA 7.14 (continued):

h) Please indicate how the PIRP Load values in the PIRP Load tab were created for each year. Please include in this discussion how or if historical data was used, how or if modeled data was used, what is the source of inter-year daily variation in load, and whether and how the same base assumptions were used to create load profiles in multiple years.

i) Confirm that in the Top 90 tab, the data in each year for "Load w/ DG", "Load Less Renewables w/ Consumed", and "Load Less Renewables" were independently sorted, and by doing so, the linkage between the values for a given day have been lost (that is, the xth hour in one column does not always correspond to the same hour that is listed in the xth hour in other columns). Further confirm that the value for the Top 90 Export columns do not always subtract "Load Less Renewables" from "Load Less Renewables w Consumed" for the same hours in the year. If deny, please explain.

j) Confirm that the Delivered, Production, and Site data on the "Solar Customer Data" tab was taken from the test year based on actual consumption and production of systems during that time period (July 2018 – June 2019). If deny, please explain.

k) Was any effort made in this analysis to ensure that the Solar Customer Data consumption data, which is driven in part based on weather and day of the week, was aligned with the weather and day of the week that impacted the forecasted loads for 2020 through 2024?

Response:

a) The data on the Renewables tab includes existing utility scale solar, wind, biomass, biogas, and geothermal generation. This does not include a forecast of new utility scale renewable resources.

b) Please see the attached file ExcelAPS19RC00457 for nameplate MW AC assumptions for utility scale wind and solar, and MW AC and DC nameplate assumptions for distributed solar. The 2019 value assumed for rooftop solar was 122 MW DC/104 MW AC. The incremental value for 2018 over 2018 is zero.

c) The data provided was comprised of the following Residential customer classes: E-12 Solar, ET Solar, ECT Solar, R-2

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Response to SEIA 7.14 (continued):

Solar, R-3 Solar, R-TOU-E Solar, and R-TECH Solar.

d) APS models annual degradation in existing utility scale solar photovoltaic arrays, which accounts for the small reductions in renewable generation over the whole period. The renewable generation values also include a biomass contract that expires in mid-2023, which explains the larger reductions in 2023 and 2024.

e) No, please see the Company's response to SEIA 7.14a. APS plans to add more utility scale renewable capacity by 2024.

f) There were small anomalies in some of the meter data, so values were manually adjusted in some of the night time hours to reflect zero solar production.

g) Annual market adoption of DG was developed using a Bass diffusion model. Hourly DG production values were developed using a regression analysis of historical weather and DG production data in conjunction with the Typical Meteorological Year (TMY), which is based on 10-year averages of observed weather data.

h) Please see APS's 2019 Preliminary Integrated Resource Plan pages 12-15 for a description of the Company's load forecast methodology (the APS 2019 Preliminary IRP can be found at this link: https://docket.images.azcc.gov/0000199276.pdf). Historical data is used to generate load profiles. Variations in inter-year load are driven by weather, customer, and usage changes. The same base assumptions are used in the forecast.

i) Both statements are confirmed.

j) The Delivered, Production, and Site data on the "Solar Customer Data" tab reflects actual Test Year information based on all solar customers that had complete data. The information was then grossed up to 100% of actual solar customers.

k) Yes.

Rodney J. Ross
Manager
State Regulatory Affairs

Mail Station 9708
PO Box 53999
Phoenix, Arizona 85072-3999
Tel 602-250-4944
Rodney.Ross@aps.com

March 9, 2020

Court S. Rich
Rose Law Group pc
7144 E. Stetson Drive, Suite 300
Scottsdale, Arizona 85251

RE: Arizona Public Service Company (APS or Company)
Response to SEIA's Eleventh Data Request
Docket No. E-01345A-19-0236

Dear Mr. Rich:

Arizona Public Service Company's (APS or Company) response to SEIA's Eleventh Data Request in the above docket is available on the APS 2019 Rate Case SharePoint Extranet Site.

Please let me know if you have any questions.

Sincerely,

Rodney J. Ross

RJR/bgs

cc: Hopi Slaughter

SOLAR ENERGY INDUSTRIES ASSOCIATION'S ELEVENTH SET OF DATA REQUESTS TO ARIZONA PUBLIC SERVICE COMPANY REGARDING THE APPLICATION TO APPROVE RATE SCHEDULES DESIGNED TO DEVELOP A JUST AND REASONABLE RATE OF RETURN DOCKET NO. E-01345A-19-0236 FEBRUARY 27, 2020

SEIA 11.1: Please refer to the Company's Cost of Service model and response to SEIA 4.6, which states "Customers are typically combined into cost-of-service classes based on similar load characteristics and cost drivers."

a) Does the Company interpret the Commission's ruling that residential rooftop solar customers warrant a separate class in a cost-of-service study to have explicitly required that the Company separately model Legacy Solar (Energy), Legacy Solar (Demand), R-Solar (TOU), and R-Solar (Demand) customers? If so, please indicate where the Commission required this level of separation. If not, please explain why the Company chose this approach.

b) Other than their choice of tariff, please indicate how the customers on each of the solar tariffs mentioned in a) above differ in their underlying load characteristics and cost drivers. Provide all analyses in this or other cases that were performed based on the actual load characteristics and cost drivers of solar customers that is independent of the customer's choice of tariff.

c) Other than their choice of tariff, please indicate how the customers in the RTOU tariff differ in their underlying load characteristics and cost drivers from customers in the R-DEMAND tariff. Provide all analyses in this or other cases that were performed based on the actual load characteristics and cost drivers of these customers that is independent of the customer's choice of tariff.

d) Other than their choice of tariff, please indicate how the customers in the RTOU tariff and R-DEMAND differ in their underlying load characteristics and cost drivers from customers on the R-BASIC (0-600 kW), R-BASIC (600- 1000 kW), and R-BASIC (1000+ kW) tariffs. Provide all analyses in this or other cases that were performed based on the actual load characteristics and cost drivers of these customers that is independent of the customer's choice of tariff.

e) Confirm that customers who have an average energy usage over 1,000 kWh per month can self-select into either the R-TOU, R-2, or R-3 tariff without restriction or additional qualification. If deny, please indicate what tariffs are open to these customers that do not contain additional requirements.

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SEIA 11.1 (continued):

f) Does the Company have any restrictions on what tariffs customers in multifamily buildings can select? If so, please describe them.

g) Does the Company believe that customers living in single-family residences and customers living in multi-family residences have sufficiently similar load characteristics and cost drivers that they should be grouped into a single cost of-service class? If so, please provide any analysis the Company has performed to support this conclusion.

h) Does the Company believe that customers with electric heat and customers without electric heat have sufficiently similar load characteristics and cost drivers that they should be grouped into a single cost-of-service class? If so, please provide any analysis the Company has performed to support this conclusion.

i) Does the Company believe that customers with air condition and customers without air condition have sufficiently similar load characteristics and cost drivers that they should be grouped into a single cost-of-service class? If so, please provide any analysis the Company has performed to support this conclusion.

j) Does the Company believe that customers with traditional central air condition systems and customers with evaporative or "swamp cooler" air condition systems have sufficiently similar load characteristics and cost drivers that they should be grouped into a single cost-of-service class? If so, please provide any analysis the Company has performed to support this conclusion.

k) Does the Company believe that customers who live in its urban territories and customers who live in its rural territories have sufficiently similar load characteristics and cost drivers that they should be grouped into a single cost of-service class? If so, please provide any analysis the Company has performed to support this conclusion.

Response:

a. Please refer to the response to SEIA 4.6 for a discussion on Commission Decision No. 75859. Cost-of-service classes are typically broad groups of relatively similar customers for which rates are developed or may be developed. In rate cases, a cost-of-service study assesses how well these rates

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Response to SEIA 11.1 (continued):

recover the cost of service for each group. Therefore, the cost-of-service classes are typically comprised of individual rates or groups of similar rate types (e.g. residential demand rates).

Within these groups there are a variety of individual customers with varying loads and usage patterns. It would be impractical and unnecessary to develop a separate rate for each individual customer or subgroup. For example, it is not contemplated or warranted to have separate rates for customers that own certain appliances, live in different locations, have different aged homes, or have other nuances that may impact their loads.

However, partial requirements customers have always warranted special rate treatment. Because the customer generates their own power and potentially exports power to the grid, special rate provisions are necessary to compensate the customer for the exported power, provide backup service for the generator, and to appropriately recover the costs of the grid services provided by the utility.

The Commission has authorized special rate provisions and programs for partial requirements customers for decades. In the last rate case, significant changes to those rates were approved. The legacy residential net metering program coupled with inclining block energy rates, which incented the early adoption of solar generation, were frozen in the last case because they over compensated solar customers for the exported power, did not adequately recover costs for providing backup service, and significantly under-recovered the costs for the grid services provided by the utility. These issues, coupled with the explosive growth in solar adoption, resulted in the potential of a billion dollars of under-recovered costs shifted to other residential customers.

To address these issues, the Commission authorized new rate choices for solar customers and new methods for compensating exported power. However, existing solar customers were grandfathered on their existing rates and net metering program.

Although the Company has not proposed any further changes to the solar rates in this proceeding, the solar customers were separated into separate cost-of-service groups to assess how well these new rate choices and

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Response to SEIA 11.1 (continued): programs are addressing these cost recovery gaps and to monitor the continued cost shift from the grandfathered solar customers.

b. Please refer to part a. Please also see LRSWP 11.

c. Please refer to part a. Please also see Initial 1.31.

d. Please refer to part a. Please also see Initial 1.31.

e. Yes.

f. No.

g. Please refer to part a.

h. Please refer to part a.

i. Please refer to part a.

j. Please refer to part a.

k. Please refer to part a.

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SEIA 11.2: Please refer to the Company's 2018-2019 Load Study report. For each class, provide a step-through of customers leaving and joining that tariff through the test year, indicating which tariff they switched from or to or whether they joined or left the service territory, or whether they installed solar. For instance, the R_2_No_Solar class had 52,405 customers at the beginning of the test year and 66,834 at the end of the test year, for a net gain of 14,429. The request is seeking where these customers came from (e.g. 1,000 switched from the R_BASIC tariff, 1,500 started new service, 500 left for R_2_Solar, 300 stopped service, etc.) for each class.

Response: Please see attachment ExcelAPS19RC00898 for APS's monthly residential rate migration report. This information tracks the movement from the old residential rates to the new residential rates during the implementation of the last rate case. The Company does not track the movement of individual customers between the new rate choices.

Witness: Leland Snook

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SEIA 11.3: Refer to the Company's 2019 Q4 earnings call presentation, available at https://seekingalpha.com/article/4326112-pinnacle-west-capital-corporation-2019-q4-results-earnings-call presentation?mod=mw_quote_news

a) Refer to page 14 of the presentation, showing the Company's projected capital expenditures.

i. Please provide more detail on the types or categories of projects shown in the Company's projected capital expenditures.

ii. For the transmission and distribution portion, indicate what percentage of the projected spending is required for load growth purposes.

iii. For the clean generation portion, please provide details on the types and MW of projects supported by capital expenditures.

iv. Did the Company consider signing PPAs to meet its clean generation commitments, and if so, is that included in the projected capital expenditure chart in this presentation?

v. Did the Company assume that PURPA projects would be available to meet its clean generation commitments in the future? If so, please indicate what assumptions were used.

Response: i. Please refer to the table below. Expense represents 2019 actual capital expenditures and 2020 through 2022 forecasted capital expenditures by category and type of project. Forecasted expenses will adjust and/or shift between categories and project types according to business needs and updated information.

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Response to SEIA 11.3 (continued):

Expense by 10-K Category and Project Type (In millions)

10-K Category	Project Type	2019	2020	2021	2022
Clean	Corporate Initiatives	2	99	477	671
Clean	Regulatory Mandates	25	17	-	-
Clean	Other Programs	8	5	13	-
Clean	Nuclear Generation	133	131	123	123
Distribution	Corporate Initiatives	16	51	79	96
Distribution	Regulatory Mandates - Program	11	9	9	9
Distribution	Safety Mandates	13	19	15	15
Distribution	Other Programs	177	128	145	123
Distribution	Other Projects	107	165	-	-
Distribution	Obligation to Serve	56	37	7	11
Distribution	Obligation to Serve - Program	140	144	188	193
Environmental	Environmental Mandates - Program	8	13	15	14
Environmental	Environmental Mandates	19	31	38	30
Ocotillo	Corporate Initiatives	14	-	-	-
Other	Corporate Initiatives	10	14	8	-
Other	Environmental Mandates - Program	-	1	1	1
Other	Regulatory Mandates	0	2	-	-
Other	Safety Mandates	8	1	0	-
Other	Other Programs	43	57	45	51
Other	Other Projects	56	70	104	32
Other	Obligation to Serve - Program	20	15	25	28
Traditional Generation	Corporate Initiatives	2	4	12	23
Traditional Generation	Environmental Mandates - Program	2	2	2	4
Traditional Generation	Regulatory Mandates - Program	2	2	5	-
Traditional Generation	Environmental Mandates - Program	5	1	3	0
Traditional Generation	Regulatory Mandates	27	8	8	9
Traditional Generation	Safety Mandates	7	4	3	3
Traditional Generation	Other Programs	71	31	43	35
Traditional Generation	Other Projects	69	87	77	46
Transmission	Corporate Initiatives	-	-	1	1
Transmission	Regulatory Mandates - Program	5	19	5	7
Transmission	Regulatory Mandates	10	9	36	13
Transmission	Safety Mandates - Program	4	-	4	-
Transmission	Other Programs	22	27	30	56
Transmission	Other Projects	114	85	100	110
Transmission	Obligation to Serve	24	42	27	22
Grand Total		1,231	1,331	1,650	1,725

NOTE: Represents direct cost only.

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Response to SEIA 11.3 (continued):

ii. Please see the table below for the percent of transmission and distribution annual expense (based on expenditures in the table provided in response to 11.3.a.i) required for load growth purposes.

Percent of Annual Spend Required for Load Growth

	2019	2020	2021	2022
Distribution	52%	40%	34%	26%
Transmission	68%	57%	84%	37%

iii. Clean generation projects and/or programs consist of capital expenditures to support the existing Palo Verde Generating Plant, energy storage solutions associated with existing grid-scale solar generation, existing behind-the-meter solar programs and projects, and new wind and solar generation. The exact MW associated with new wind, solar, and battery projects during this time period is still being determined.

iv. Yes. APS expects to achieve a portion of its clean energy commitment through Purchase Power Agreements; however, such expenses are not included in capital expenditures as PPAs they are recovered through the Company's Power Supply Adjustor (PSA).

v. APS did not include any PURPA generation assumptions in this capital expenditures forecast. Note than any PURPA contracts would be PPAs.

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SEIA 11.4: Refer to page 17 of the presentation. Please provide any analyses the Company has performed related to the system reliability benefits of different durations of storage.

Response: APS determines the capacity value of storage technologies using a Top 90 Hours approach (proxy for ELCC). APS simulates the dispatch of hourly storage against the net load curve. The analysis results show capacity value as a percent of nameplate, based on a mix of three and four-hour duration batteries. Attachment ExcelAPS19RC00899 provides a summary of that analysis.

Witness: Brad Albert

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SEIA 11.5: Please refer to the Company's response to SEIA 7.1 and SEIA 2.7. In SEIA 2.7(d), the Company indicated that the installation labor for a bi-directional, standard, and production were $92.65, $26.08, and $26.08, respectively. In SEIA 7.1(l), the Company stated "Installation of a bi-directional meter is the same as a standard meter, except that typically APS would also set the additional production meter during the same visit." In SEIA 7.1(m), the Company stated that "Installation costs are determined by the job classification and the time it takes to perform the work."

a) Confirm that the total cost of a production meter contains labor costs to install that meter, and these costs are to install only that production meter. If deny, please explain.

b) Confirm that the total cost of a standard meter contains labor costs to install that meter, and these costs are to install only that standard meter. If deny, please explain.

c) Confirm that the total cost of a bi-directional meter contains labor costs to install that meter, and these costs are to install only that bi-directional meter. If deny, please explain.

d) Confirm that the same worker installs the production meter and the bidirectional meter on the same visit. If deny, please explain.

e) Please explain why the Company charges more than 3.5 times as much to install a bi-direction meter as a standard or production meter if the same person takes the same amount of time to install either of the meters.

Response:

a) Confirmed.

b) Confirmed.

c) Confirmed.

d) If the solar installation passes inspection, APS will set both the bi-directional billing meter and the production meter on the same visit.

e) The cost of meter installation provided in SEIA 2.7(d) inadvertently reflected an error. The cost to install the bi-directional billing meter and the production meter is the same at $26.08 per meter installed. Please see the table below for

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Response to SEIA 11.5 (continued): revised meter and meter installation costs.

Typical Cost of Residential Meters

	Meter Cost	Shop Cost	Installation Material	Installation Labor	Total Cost
Standard	106.24	1.65	3.09	26.08	137.06
Bi-directional	310.00	13.40	3.59	26.08	353.07
Production	68.94	1.65	3.09	26.08	99.76
Total Solar					$452.83

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SEIA 11.6: Please refer to the Company's response to SEIA 7.1(j) and SEIA 2.7. Please provide additional details about the preparation and testing procedures that result in a shop cost for bi-directional meters that is more than 8 times as much as a production or standard meter.

Response: The cost to test a bi-directional meter is higher because the testing period for a bi-directional meter is seven times longer than the testing period for a production or standard meter. The amount of time required to test a meter depends on the watt-hour constant (the "Kh") of the meter, which represents the amount of energy measured in a single pulse (for electronic meters) or disk revolution (for electromechanical meters). A bi-directional meter nameplate Kh is 7.2, while a standard or production meter nameplate Kh is 1.

Witness: Leland Snook

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SEIA 11.7: Please refer to the Company's response to SEIA 7.8(d). Would the Company commit to maintaining the existing on-peak periods for a minimum duration, such as 10 or 15 years? If not, how often does the Company plan to reevaluate whether its current on-peak periods are still sufficiently reflective of load and cost drivers, and what factors will contribute to the decision to propose new on-peak periods?

Response: No. The Company will continue to monitor its time-of-use hours over time to see if any modifications are warranted. While on-peak hours should be stable over time, there needs to be flexibility to propose any changes that are needed. Please also refer to the Company's responses to SEIA 3.14 and 3.18.

Witness: Jessica Hobbick

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SEIA 11.8: Please refer to the Company's response to SEIA 7.10(b). While the Company has not performed the specific analysis requested, does it believe the demand limiter for non-solar customers should be set to a level that is infrequently (e.g. less than one time per year), moderately (e.g. 1-2 times per year), or regularly (e.g. 3+ times per year) triggered?

Response: The Company does not have a specific value. Please refer to the Company's response to SEIA 7.10.b.

Witness: Jessica Hobbick

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SEIA 11.9: Please refer to the Company's response to SEIA 7.12(i). Please provide the count and cost of the following that have been installed or upgraded on the Company's system that were specifically required as the result of customers installing solar.

a) Reconductoring
b) Feeder additions
c) Feeder upgrades
d) Transformer additions
e) Transformer upgrades
f) Capacity bank additions
g) Capacity bank upgrades
h) Voltage regulator additions
i) Voltage regulator upgrades

Response: APS manages infrastructure investments to ensure that all facilities remain within acceptable thermal ratings, and that voltage remains within acceptable tolerances as defined by ANSI C84.1 as previously indicated. This is true for managing grid constraints considering existing and forecasted near-term additions of both load and generation to the existing grid infrastructure.

APS does not track costs in a way that allows it to determine whether or not specific upgrades and additions were caused by installing solar. Therefore, costs are not provided for sub-parts a through f. APS is aware of system voltage correction and management costs, of which customer solar installations are a contributing factor. These costs are provided in sub-part g.

a) The physics of the system (conductor type, length, physical properties, rated ampacity, reliability profile) determines the need for circuit reconductor based on expected current magnitudes on the circuit. APS has either extended a circuit to connect a generation facility (and loads) or upgraded to a larger wire size to accommodate solar PV (and load) interconnections based on customer request.

b) In the rate-case test year, APS has not added dedicated feeder circuits to connect PV. Feeder extensions (referenced in 11.9(a) are also additions to feeder infrastructure.

c) See 11.9(a) and (b).

d) The physics of the system determines the need for transformer additions or upgrades for both solar and load

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Response SEIA 11.9 (continued):

additions. APS has added transformers to connect PV sites. Note that PV installations can be behind-the-meter (e.g. rooftop PV behind an existing load interconnection) or standalone (e.g. solar covered parking, large facilities). Known transformer additions have been to accommodate larger standalone PV sites.

e) See 11.9(d)

f) See 11.9(g), (h), and (i)

g) Capacitor bank upgrades and voltage regulation infrastructure is a key focus in a high-PV-penetration system. The physics of the distribution grid, with variable resources like PV, results in wider voltage swings (PV induced light loads and ultimately reverse power flows), rapid voltage variability (corresponding to PV intermittency), and an inability to respond to grid disturbances (as evidenced in Germany's 50.2 Hz problem, and in the CA Blue Cut Fire event where 1200 MW* of solar PV was known to trip offline erroneously triggering national NERC Alerts). Many of the voltage, frequency, and grid impacts are well documented by the National Renewable Electric Labs (NREL), Electric Power Research Institute (EPRI), Institute of Electrical and Electronics Engineers (IEEE), and other states with large distributed renewable portfolios, including California and Hawaii. A component of APS's grid modernization investments include deployment of bi-directional capacitor bank controllers, feeder voltage regulators, and the control intelligence to provide for flexible operation with large volumes of solar PV, frequent instances of reverse power flow, higher voltage intermittency, and growing volumes of these types of interconnections. The IEEE 1547-2018 standard recognizes these challenges with voltage, frequency and disturbance response and provides guidance to the technology/inverter vendors to develop products that provide suitable voltage performance while still maintaining predictable synchronism to the grid during disturbance conditions.

ExcelAPS19RC00900 contains information related to capacitor banks required as the result of increased voltage fluctuations and voltage variability, to which customer solar PV installations are a contributing factor.

Witness: TBD

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Response SEIA 11.9 (continued):

h) See 11.9 (g)

i) See 11.9 (g)

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SEIA 11.10: Please refer to the Company's response to SEIA 7.14(g). Please provide the Bass diffusion and regression analyses listed in this response in their original form with formulas intact.

Response: The Bass diffusion analysis was performed for APS by a consultant, and APS does not have rights or access to that model. The regression analysis and development of hourly DG generation is provided in ExcelAPS19RC00901 and ExcelAPS19RC00902.

Witness: Brad Albert

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SEIA 11.11: Please refer to the Company's response to SEIA 7.14(k). Please describe what specific efforts were made in this analysis to ensure that the Solar Customer Data consumption data, which is driven in part based on weather and day of the week, was aligned with the weather and day of the week that impacted the forecasted loads for 2020 through 2024.

Response: Solar customer production data was aligned with the weather model that also impacted forecasted loads. Solar customer self-consumption and export energy were estimated using monthly/hourly average profiles and the hourly production data.

Witness: Leland Snook

SOLAR ENERGY INDUSTRIES ASSOCIATION'S ELEVENTH SET OF DATA REQUESTS TO ARIZONA PUBLIC SERVICE COMPANY REGARDING THE APPLICATION TO APPROVE RATE SCHEDULES DESIGNED TO DEVELOP A JUST AND REASONABLE RATE OF RETURN DOCKET NO. E-01345A-19-0236 FEBRUARY 27, 2020

SEIA 11.12: Please refer to the Company's response to SEIA 4.10. Please indicate what the listed monthly adjustments represent and how they were calculated. Also, confirm whether these adjustments should be applied to energy values or individual customers max demand values.

Response: Please see APS's response to SEIA 10.2. The adjustments are needed to calibrate the demand-related information for subgroups to ensure that they add up to the system values. They are not necessary for, and should not be applied to, the load research energy information or the billing determinant information used in the proof-of-revenue.

Specifically, the adjustments are applied to the Sum of Individual Max, Class Peak, and Adjusted Coincident Peak in the APS 2018-2019 Load Research Report.

Witness: Leland Snook

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SEIA 11.13: Please refer to the Company's response to SEIA 2.3, 7.13, and 8.1.

a) Confirm the Attachment APS19RC00456 contains the maximum monthly billing demand, which is by definition the maximum monthly demand obtained during on-peak hours, in the column labeled "kw_on". If deny, please explain.

b) Please supplement Attachment APS19RC00456 to include the maximum monthly demand, regardless of whether it occurred during on-peak hours.

Response:

a) Confirmed.

b) Attachment APS19RC00456 is a compilation of monthly on-peak billing demands. The Company does not bill residential customers on their untimed monthly maximum demands and, therefore, the requested information has not been calculated or compiled.

Witness: Leland Snook

Rodney J. Ross
Manager
State Regulatory Affairs

Mail Station 9708
PO Box 53999
Phoenix, Arizona 85072-3999
Tel 602-250-4944
Rodney.Ross@aps.com

April 2, 2020

Court S. Rich
Rose Law Group pc
7144 E. Stetson Drive, Suite 300
Scottsdale, Arizona 85251

RE: Arizona Public Service Company (APS or Company)
Supplemental Response to SEIA's Ninth Data Request
Docket No. E-01345A-19-0236

Dear Mr. Rich:

Arizona Public Service Company's (APS or Company) supplemental response to SEIA's Ninth Data Request in the above docket is available on the APS 2019 Rate Case SharePoint Extranet Site.

Please let me know if you have any questions.

Sincerely,

/s/Rodney Ross

Rodney J. Ross

RJR/bgs

cc: Hopi Slaughter

SOLAR ENERGY INDUSTRIES ASSOCIATION'S NINTH SET OF DATA REQUESTS TO ARIZONA PUBLIC SERVICE COMPANY REGARDING THE APPLICATION TO APPROVE RATE SCHEDULES DESIGNED TO DEVELOP A JUST AND REASONABLE RATE OF RETURN DOCKET NO. E-01345A-19-0236 FEBRUARY 19, 2020

SEIA 9.7: Please refer to the Company's response to SEIA 4.7b through 4.7f and the 2018-2019 Load Study reports.

a) In the 2018-2019 Load Study report, the R-TOU-E Solar Site class peak occurred on June 29th at 17:00, while the R-TOU-E Solar Delivered class peak occurred on June 30th at 20:00. Meanwhile, the Total Residential class peak of 4,022.7 MW occurred on August 5th at 18:00 and the highest June class peak was 3,499.6 MW on June 30th at 20:00. Confirm that the Company's assets that were able to serve 4,022.7 MW of load to the residential class on August 5th at 18:00 were also able to serve 3,499.6 MW of load to the residential class on June 30th at 20:00. If deny, please explain.

b) Given the Company has admitted that its distribution assets serve a mix of residential customer classes (SEIA 4.7b) and it does not separately track assets used to serve different residential classes (SEIA 4.7c), what assets are required to serve the peak load of a residential subclass that peaks at a different time from the residential class as a whole that were not already required to serve the residential class peak load as a whole?

Response:

a. Deny. The question appears to conflate and object to allocating costs to residential rate classes versus the entire residential class. A fundamental objective of cost-of-service studies is to separate customers into subclasses that best reflect similar cost drivers and, ultimately, rates. See for example NARUC's Electric Utility Cost Allocation Manual, available on public websites. The Company correctly allocated cost of service to the underlying rate classes. Any attempted re-allocations based on the entire residential class would be incorrect. Please refer to the Company's response to SEIA 4.7.

b. Please see the Company's response in part a.

Supplemental Response:

a. APS builds infrastructure to serve the peak loads of customers throughout multiple consecutive high load days. However, the Company disagrees with the suggestion being made in the question. Generation and transmission assets are acquired to serve the system peak, not the residential class peak, or any particular rate class. Therefore, the only

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NINTH SET OF DATA REQUESTS TO
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Supplemental Response (continued):

relevant comparison for resource sufficiency would be to compare the coincident peak for the rate class with the rate class load in any other hour of interest. In addition, distribution assets are built to serve the areas of the grid that they serve, not the residential class. So, resource sufficiency cannot be derived from the residential class peak.

b. Please see APS's response to part a.

Rodney J. Ross
Manager
State Regulatory Affairs

Mail Station 9708
PO Box 53999
Phoenix, Arizona 85072-3999
Tel 602-250-4944
Rodney.Ross@aps.com

June 22, 2020

Tim Hogan
ACPLI
514 West Roosevelt Street
Pheonix, AZ 85003

RE: Vote Solar's First Set of Data Requests to
Arizona Public Service Company (APS or Company)
Docket No. E-01345A-19-0236

Dear Mr. Hogan:

Arizona Public Service Company's response to Vote Solar's First Set of Data Requests in the above docket is available on the APS 2019 Rate Case SharePoint Extranet Site. Please note some of the information is Confidential and Highly Confidential, and is being provided pursuant to an executed Protective Agreement in this case.

Per an agreement with Vote Solar, responses for questions 10-18, 20-22, and 24 are granted an extension to July 1st.

Please let me know if you have any questions.

Sincerely,

/s/Rodney Ross

Rodney J. Ross

RJR/bgs

cc: Jennifer Anderson
Sachu Constantine
Eric Woychik

VOTE SOLAR'S FIRST SET OF DATA REQUESTS TO ARIZONA PUBLIC SERVICE COMPANY REGARDING THE APPLICATION TO APPROVE RATE SCHEDULES DESIGNED TO DEVELOP A JUST AND REASONABLE RATE OF RETURN DOCKET NO. E-01345A-19-0236 JUNE 5, 2020

Vote Solar 1.1: Please provide all available individual customer interval load data for January 1, 2016 through June 30, 2019. Please provide in unlocked, native electronic format with all functions, formulas, cross-references and links intact. If a census of customer interval load data is available, please provide the full census. If a census is not available, please provide a representative sample and any applicable sample weights for each customer class. Please anonymize any sensitive customer information using a unique identifier and include information necessary to match individual customer data across files as necessary. For each customer, please include at least the following information:

a. Customer Rate Schedule and any applicable rate schedule changes, as well as the dates of those changes.

b. Whether the customer is a net metering customer.

c. Whether the customer is a distributed generation (DG) customer on a program other than net metering.

d. The installed capacity (kW-DC) of any DG system or systems, if applicable.

e. The DG system type (solar PV, wind, etc.), if applicable.

f. The interconnection date of the DG system, if applicable.

g. Hourly interval load data. If hourly data is not available, please provide load data in the smallest available granularity. For DG customers, please include Delivered load, Exported load, Solar Production, and Self-consumption.

Response: Pursuant to an agreement with Vote Solar, requested customer interval data will be provided only for the current rate case Test Year ending June 30, 2019. The remaining data requested will be provided from January 2016 through June 30, 2019. The files in response to this question contain customer data, are Highly Confidential, and are being provided pursuant to an executed Protective Agreement.

a. Please see the attached spreadsheet ExcelAPS19RC01328.

b. Please see the attached spreadsheet ExcelAPS19RC01329. Please refer to "EPR6-RDR" for net metering.

Witness: Leland Snook

VOTE SOLAR'S FIRST SET OF DATA REQUESTS TO ARIZONA PUBLIC SERVICE COMPANY REGARDING THE APPLICATION TO APPROVE RATE SCHEDULES DESIGNED TO DEVELOP A JUST AND REASONABLE RATE OF RETURN DOCKET NO. E-01345A-19-0236 JUNE 5, 2020

Response to Vote Solar 1.1 (continued):

c. Please see the attached spreadsheet ExcelAPS19RC01329. Please refer to "EPR2-RDR", "RCP-RDR", and "E56R-RDR" for distributed generation other than net metering.

d. Please see the attached spreadsheet ExcelAPS19RC01330.

e. Please see the attached spreadsheet ExcelAPS19RC01330.

f. Please see the attached spreadsheet ExcelAPS19RC01330.

g. Hourly load data is being compiled and will be provided as soon as possible in a supplemental response.

VOTE SOLAR'S FIRST SET OF DATA REQUESTS TO ARIZONA PUBLIC SERVICE COMPANY REGARDING THE APPLICATION TO APPROVE RATE SCHEDULES DESIGNED TO DEVELOP A JUST AND REASONABLE RATE OF RETURN
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Vote Solar 1.2: Please identify and quantify each item of cost that is recovered from customers through the Grid Access Charge for DG customers under the R-TOU rate. Provide all analyses qualifying the amount of the proposed Grid Access Charge.

Response: Please see APS's response to SEIA 4.5.

Witness: Jessica Hobbick

VOTE SOLAR'S FIRST SET OF DATA REQUESTS TO ARIZONA PUBLIC SERVICE COMPANY REGARDING THE APPLICATION TO APPROVE RATE SCHEDULES DESIGNED TO DEVELOP A JUST AND REASONABLE RATE OF RETURN DOCKET NO. E-01345A-19-0236 JUNE 5, 2020

Vote Solar 1.3: Reference APS's R-2 and R-3 rates:

a. Please identify, by customer (using an anonymized, but consistent customer reference), each month when a full requirements customer's demand charge was "limited to a kW no higher than that which would result in a 15% load factor, based on the Customer's kWh usage during the month" as provided in the tariff.

b. For each instance identified in response to (a), above, please state: (i) the amount of charge that would have been assessed without limiting the charge to a kW no higher than that which would result in a 15% load factor; and (ii) the charge that was actually assessed.

c. Please identify, by customer (using an anonymized, but consistent customer reference) each month when a DG customer's demand charge would have been lower if it was "limited to a kW no higher than that which would result in a 15% load factor, based on the Customer's kWh usage during the month."

d. For each instance identified in response to (c), above, please state: (i) the amount of the charge that would have been assessed if the charge had been limited to a kW no higher than that which would result in a 15% load factor; and (ii) the charge that was actually assessed.

Response:

a. Please see attachment Excel APS19RC01392.

b. Please see the Company's response to part a.

c. Please see attachment ExcelAPS19RC01393.

d. Please see the Company's response to part c.

Witness: Jessica Hobbick

VOTE SOLAR'S FIRST SET OF DATA REQUESTS TO ARIZONA PUBLIC SERVICE COMPANY REGARDING THE APPLICATION TO APPROVE RATE SCHEDULES DESIGNED TO DEVELOP A JUST AND REASONABLE RATE OF RETURN DOCKET NO. E-01345A-19-0236 JUNE 5, 2020

Vote Solar 1.4: Please describe the Cost of Service (COS) methodology used to allocate costs and revenues to customers with DG, including:

a. A narrative explanation of the methodology employed to evaluate the cost to serve DG customers in the cost of service study (COSS) and the revenues received from DG customers.

b. For each cost allocated based on demand, please state whether the utility-served load (customer (site) load, less the amount met with distributed generation behind the meter), site load (customer load whether served by utility, by behind the meter generation, or both), sum of site load and exports, exports, or some other measure was used to allocate that cost.

c. Describe how the load research data were used to derive the DG customer determinants, including but not limited to how each of the following allocators were derived for DG customers:

i. Energy
ii. Energy, Less AG-1
iii. NCP
iv. Individual Max Demand
v. 1CP
vi. 4CP
vii. Weighted Energy
viii. Weighted Energy x/AG-1
ix. Average and Excess
x. Customer Counts
xi. Overhead Service
xii. Underground Service
xiii. Meter Cost
xiv. SFR G-7

d. Fully explain any differences in the COSS method employed for DG customers in comparison with non-DG customers.

e. Describe the differences, if any, between the cost of service methodology used for customers with DG in this case and the methodology used for the cost of service study in the prior rate case, as described by Mr. Snook's Direct Testimony at pages 24- 25 in Docket E-01345A-16-0036.

Witness: Leland Snook

VOTE SOLAR'S FIRST SET OF DATA REQUESTS TO ARIZONA PUBLIC SERVICE COMPANY REGARDING THE APPLICATION TO APPROVE RATE SCHEDULES DESIGNED TO DEVELOP A JUST AND REASONABLE RATE OF RETURN DOCKET NO. E-01345A-19-0236 JUNE 5, 2020

Response to Vote Solar 1.4:

a. The cost allocation narrative for residential DG customers is provided in the Company's response to SEIA 2.6, part b. The revenues allocated to the DG classes are based on actual Test Year amounts.

b. Please refer to the Company's response to SEIA 2.6, part b.

c. The allocators i (energy) through ix (average and excess) were derived from the relevant load research information for the site load for the DG classes. These allocated costs were then credited based on the load research information for the solar production for each DG class, as described in the Company's response to SEIA 2.6, part b. The allocators x (customer counts) through xii (underground service) use the year-end customer counts and relevant per-unit costs for service drops. The allocator xiii (meters) do not rely on load research information, but rather, are derived from the number of meters and per-unit meter costs for each class. SFR G-7 is a summary of all the specific energy-based, demand-based, and customer-based allocators, including the allocators referenced in this question. The specific load research information for each allocator is referenced in the document.

   The load research information supporting these allocators is provided in the Company's response to Initial 1.31. The formulation of the allocators is provided in workpaper LRS_WP4DR.

d. The demand and energy allocators for all customers were based on the site load for the class. However, the DG classes further received a credit for their solar production as described in the Company's response to SEIA 2.6, part b.

e. The DG cost allocation in the current rate case uses the same method as the last rate case.

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Vote Solar 1.5: Please provide:

a. Monthly customer counts for each residential customer sub-class (tariff option) from January 1, 2016 to present,

b. The number for customers moving from one sub-class to each other sub-class by month, and

c. Any survey, interview, or similar data or information collected by the Company indicating customers' reasons for changing rate option/sub-class.

Response:

a. Please see APS's response to Initial 1.31a.

b. APS did not track this information back to January of 2016. Please see the attached spreadsheet ExcelAPS19RC01360.This information tracks the monthly movement of customers between rates.

c. Please see APS's response to Staff 2.7.

Witness: Jessica Hobbick

VOTE SOLAR'S FIRST SET OF DATA REQUESTS TO ARIZONA PUBLIC SERVICE COMPANY REGARDING THE APPLICATION TO APPROVE RATE SCHEDULES DESIGNED TO DEVELOP A JUST AND REASONABLE RATE OF RETURN DOCKET NO. E-01345A-19-0236 JUNE 5, 2020

Vote Solar 1.6: Reference the APS Cost of Service Study Schedule G7.

a. Please identify, separately for each Residential subclass provided in the columns on page 4 of 12, the date and hour (specifying hour beginning or ending) for each of the distribution demand allocators in rows 10-16.

b. If the subclass NCP allocator dates and/or hours identified in response to (a), above, differ across subclasses, please identify each subclass's demand during each NCP hour for each of the subclasses and provide the peak hour for all residential customers as a whole (i.e., the date and hour of the highest cumulative demand of all residential customers across all subclasses identified in the columns Z-AH) and each sub-class's load during that cumulative peak hour.

c. For each of the demand allocators used, please specify how solar customers' exports were accounted for, including whether exported electricity reduced demand (negative demand), whether exports were excluded from the demand cost allocation, whether the absolute value was used (exports added to inflow demand), or whether exports were treated in some other manner.
Please identify the date and hour (specifying hour beginning or ending) for each of the production and transmission demands used to allocate costs in rows 17-32 on page 8 of 12.

Response:

a. The information is provided in the Company's response to APS initial 1.31. The information is hour ending.

b. Please refer to APS Initial 1.31. The Company does not compute the share of the residential class peak for each cost-of-service sub class because it does not allocate costs in that manner. Therefore, that information is not available.

c. Exports are transacted through a net metering program or a purchase rate and are therefore not part of the cost allocation process in a rate case. Please refer to the Company's response to part a.

Witness: Leland Snook

VOTE SOLAR'S FIRST SET OF DATA REQUESTS TO ARIZONA PUBLIC SERVICE COMPANY REGARDING THE APPLICATION TO APPROVE RATE SCHEDULES DESIGNED TO DEVELOP A JUST AND REASONABLE RATE OF RETURN DOCKET NO. E-01345A-19-0236 JUNE 5, 2020

Vote Solar 1.7: Please provide the following for each distribution substation serving residential customers:

a. The date and hour (specifying hour beginning or ending) of the peak load at that substation during the test year;

b. The top 50 load hours during the test year and, for each, the peak load during that hour;

c. The number of residential customers interconnected to that substation during the test year;

d. The number of customers other than residential customers interconnected to that substation during the test year.

Response:

a. Please see the attached spreadsheet ExcelAPS19RC01390 which includes the peak load and the time of the peak load on each APS distribution substation transformer as available.

b. APS does not have the top 50 load hours for each of its residential distribution substations. Please see the Company's response to SEIA 1.14.a for the top 90 hours proxy used to determine Effective Load Carrying Capability for the APS system.

c. The total number of residential customers interconnected to each distribution substation as of June 30, 2019 is provided in the attached spreadsheet ExcelAPS19RC01391.

d. The total number of non-residential customers interconnected to each distribution substation as of June 30, 2019 is provided in the attached spreadsheet ExcelAPS19RC01391.

Witness: TBD

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Vote Solar 1.8: Please indicate the portion of the cost of production meters installed on DG customer premises that is included in the meter cost for DG customers and the portion of DG customer production meters that is included in the cost of non-solar customers in the COSS. Please provide a specific citation, including spreadsheet title(s), tab(s), and cell location(s), where the production meter costs are input into the COSS and where those costs are allocated to each class or sub-class.

Response: The production meters are only allocated to the solar rate classes. The derivation of the meter cost allocation is provided in workpaper LRS_WP4DR, page 19. The information is in the cost-of-service model in workpaper LRS_WP11DR, COS tab, row 1787. For further detail please refer to the Company's response to SEIA 2.7.

Witness: Leland Snook

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Vote Solar 1.9: For each of the following allocators, please provide the date (month/day/year) and hour of the relevant peak for each customer class and sub-class in the cost of service study:

a. NCP

b. 1 CP

c. 4 CP

Response:

a. Please refer to APS Initial 1.31 where NCP and 1 CP information including date and time can be found.

b. Please refer to the Company's response part a.

c. Please refer to APS Initial 1.31 where 4 CP information can be found by averaging the monthly CP values for June through September.

Witness: Leland Snook

VOTE SOLAR'S FIRST SET OF DATA REQUESTS TO ARIZONA PUBLIC SERVICE COMPANY REGARDING THE APPLICATION TO APPROVE RATE SCHEDULES DESIGNED TO DEVELOP A JUST AND REASONABLE RATE OF RETURN DOCKET NO. E-01345A-19-0236 JUNE 5, 2020

Vote Solar 1.19: Please identify APS's forecasted annual Transmission and Distribution costs by year for each of the next ten (10) years? Please separately identify capital expenditure, fixed operation and maintenance (O&M), and variable O&M.

Response: Please see the Company's response to Staff 13.8, which includes the capital expenditure table from page 63 of the Company's SEC Form 10-K filing for the period ending December 31, 2019. The table is a summary of the Company's estimated capital expenditures for the years ending 2020, 2021, and 2022. APS does not currently develop a ten-year capital expenditure budget.

Please also see the Company's response to Staff Data Request 3.30 and RUCO 3.12.

For additional information on capital transmission projects for the next ten years, please see the Company's 2020-2029 Ten-Year Transmission Plan at: https://docket.images.azcc.gov/E000004723.pdf.

Unlike capital expenditures, O&M projects do not have multi-year project lead times. APS only budgets O&M one year ahead.

Witness: Elizabeth Blankenship

VOTE SOLAR'S FIRST SET OF DATA REQUESTS TO ARIZONA PUBLIC SERVICE COMPANY REGARDING THE APPLICATION TO APPROVE RATE SCHEDULES DESIGNED TO DEVELOP A JUST AND REASONABLE RATE OF RETURN DOCKET NO. E-01345A-19-0236 JUNE 5, 2020

Vote Solar 1.23: Separately for each of APS's thermal and renewable generation plants, please provide the annual fixed O&M; the variable O&M costs; and the capacity factors for each of the most recent five (5) years.

Response: Please see the Company's response to Sierra Club Data Request 1.15.a. for fixed O&M, variable O&M, and capacity factors for each of APS-owned generating plants for each of the most recent 5 years. This information is Highly Confidential and is being provided pursuant to an executed Protective Agreement in this docket.

Witness: Brad Albert

VOTE SOLAR'S FIRST SET OF DATA REQUESTS TO ARIZONA PUBLIC SERVICE COMPANY REGARDING THE APPLICATION TO APPROVE RATE SCHEDULES DESIGNED TO DEVELOP A JUST AND REASONABLE RATE OF RETURN DOCKET NO. E-01345A-19-0236 JUNE 5, 2020

Vote Solar 1.25: Please state whether APS's energy costs have declined during the previous five (5) years as a result of increased penetration of renewable energy and provide any analysis by or referenced by APS regarding the impact on energy prices from increased renewable generation.

Response: APS's annual Purchased Power and Fuel (PP&F) costs for the past 5 years are:

	Annual PP&F Costs (dollars in thousands)
2015	$981,706
2016	$1,007,187
2017	$965,851
2018	$1,004,302
2019	$977,970

Some of the net energy cost savings from the transactions in the CAISO Energy Imbalance Market is likely due to the increase in solar power in California, which can contribute to low or even negative EIM prices during certain hours in the winter months. On the other hand, these low or negative EIM prices also contribute to losses on the resale by APS of excess solar power, which would increase energy costs. In addition, the price of natural gas has decreased over the last five years. However, the Company has not assessed whether this decrease is due to the increased supply of natural gas or reduced demand from conservation and renewable energy.

Witness: Leland Snook

VOTE SOLAR'S FIRST SET OF DATA REQUESTS TO ARIZONA PUBLIC SERVICE COMPANY REGARDING THE APPLICATION TO APPROVE RATE SCHEDULES DESIGNED TO DEVELOP A JUST AND REASONABLE RATE OF RETURN
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Vote Solar 1.26: Please state whether APS's production cost allocation methodology in the COSS accounts for costs to provide and/or purchase ramping capacity and, if so, please describe how those costs are accounted for in production cost allocation.

Response: Ramping costs are not specifically allocated to customer classes but rather included in the overall production demand costs, which are allocated using the average-and-excess method.

Witness: Leland Snook

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Vote Solar 1.27: What amount of annual energy, ancillary services, and ramping capacity are allocated to the CAISO, and received from CAISO, through APS as a Scheduling Coordinator? Is any of this revenue differentiated with respect to fixed versus variable costs in APS's revenue allocation? If so, how is the revenue allocated among customer classes?

Response: The costs and revenues from transactions with the CAISO are accounted for and recovered/credited through the Power Supply Adjustor (PSA) mechanism and the fuel cost included in base rates. The PSA costs are not allocated per se, but rather recovered from all customers through the same energy charge. The fuel costs recovered through base rates are allocated based on hourly fuel costs weighted by hourly loads. The CAISO energy sales and purchases for the Test Year being compiled and will be provided as soon as possible as a supplement to this response. Ramping costs are not recovered as a specific cost item, but instead bundled with other generation costs.

Witness: TBD

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Vote Solar 1.28: Please refer to Mr. Snook's Direct Testimony page 11, lines 3 to 4, which states that Decision No. 69663 requires APS to allocate production costs based on the Average and Excess Demand (AED) method.

a. Please identify, by page(s) and line(s) within the Order, the language Mr. Snook relies upon.

b. Please explain Mr. Snook's understanding for why the language identified in response to (a), above, continues to apply 13 years and several rate cases later.

Response:

a. Decision No. 69663 (June 28, 2007) ordered the Company to propose an energy-weighting cost allocation method for production demand in its next rate case [page 71, line 4-6].

b. Allocation methods can be changed over time. However, Mr. Snook recognizes that the average-and-excess method for allocating production demand costs coupled with an energy cost allocator that is weighted by hourly fuel costs have addressed the concerns of advocates for both residential and large industrial customers on this issue. Additionally, it is a commonly used and accepted allocation method in the industry. Therefore, the Company is not proposing to change the allocator in this rate case.

Witness: Leland Snook

VOTE SOLAR'S FIRST SET OF DATA REQUESTS TO ARIZONA PUBLIC SERVICE COMPANY REGARDING THE APPLICATION TO APPROVE RATE SCHEDULES DESIGNED TO DEVELOP A JUST AND REASONABLE RATE OF RETURN DOCKET NO. E-01345A-19-0236 JUNE 5, 2020

Vote Solar 1.29: Please refer to Mr. Snook's Direct Testimony page 12, footnote 2, which states: "The … exception is for residential rooftop solar customers. To address the mismatch between what solar and non-solar residential customers actually pay for the transmission portion of their bill, APS reallocated the direct assigned cost responsibility to residential customers using each residential sub-class's 4CP."

a. Please provide the initial allocation to each sub-class and the resulting re-allocated cost for each subclass.

b. Please provide the inputs, calculations and workpapers related to the adjustment referenced in this footnote. Please provide in unlocked, electronic, native format with all inputs, formulas, functions and cross references intact.

c. Please explain why there is an exception to the double counting for transmission cost allocation for residential rooftop solar customers.

d. Please explain what is meant by "what solar and non-solar residential customers actually pay for the transmission portion of their bill…"

e. Identify the date and time (specifying hour beginning or ending) of the 4CP hours for each residential sub-class.

f. Explain the basis for reallocating a transmission cost for the residential class to individual sub-classes' 4CP hours instead of each sub-classes' loads at the time of the 4CP used to allocate to the residential class as a whole.

Response:

a. The information is provided in the attached spreadsheet ExcelAPS19RC01386.

b. The development of the allocators is provided in workpaper LRS_WP11DR, COS tab, rows 1832 and 1950. The allocated values can be found in the same workpaper and tab, rows 995 and 997.

c. There is no double counting of transmission costs to residential solar customers. The referenced "exception" refers to how the costs are allocated among the residential classes. To ensure that there is no double counting on a jurisdictional level, the transmission costs are first allocated to the residential class based on the open access transmission revenues for the Test Year. Then to ensure

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Response to Vote Solar 1.29 (continued):

that the transmission costs appropriately reflect the cost of service for each residential subclass, including the solar classes, the costs are sub-allocated to the residential classes based on each class's 4 CP.

d. This refers to the mismatch of the transmission revenue recovered from solar customers and their cost responsibility for transmission services. This mismatch occurs because transmission costs are driven by 4 CP demands and recovered from customers through a kWh charge on the bill. Solar customers significantly reduce their billed kWh but only partially reduce their coincident-peak demand. As a result, they significantly underpay for the transmission services that they continue to receive. This under-recovery does not occur with non-solar customers because they continue to purchase all of their kWh consumption from the utility, and therefore, pay for the transmission services that they receive.

e. This information is provided in the Company's response to Initial 1.31.

f. The Company's allocation method described in the responses to parts b and c is consistent across the revenue classes, is consistent with the FERC transmission cost allocations, and better reflects transmission cost responsibility for the solar subclasses. Please also see Decision No. 76295 (August 18, 2017), paragraph 12.2 of Exhibit A (the Settlement in the Company's last rate case), in which APS agreed to perform the Average and Excess methodology to allocate production demand costs to residential and general service classes and then reallocate production demand within the residential sub-classes based on 4CP.

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Vote Solar 1.30: Please refer to Mr. Snook's Direct Testimony page 14, lines 1 to 2, which states: "APS is not proposing to rebalance revenue responsibility in this rate case based on the results."

a. Please explain this statement.

b. When will revenue responsibilities be rebalanced and reflected in rates if not in this rate case?

Response:

a. The Company is proposing an equal percent increase to all customer classes in this rate case, even though the cost of service results could support a higher increase for some classes and lower for others.

b. Because of the significant "rebalancing" across the customer classes and among individual customers in the same class in the last rate case, and the resulting disparate bill impacts, the Company proposes to leave further rebalancing among the classes to future cases.

Witness: Leland Snook

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Vote Solar 1.31: Please refer to Mr, Snook's Direct Testimony, Exhibit LRS-3DR. Please identify the most significant reasons causing the rate of return for medium-sized customers, i.e., R-Basic (601kW–999kW), to be less than it is for smaller customers in this class, i.e., R-Basic (0–600kW), or for larger consumers in this class, i.e., R-Basic (1000+ kW).

Response: The Company has not conducted a definitive assessment of this issue. However, the cost-of-service and load research information show that the R-Basic class has a lower average monthly load factor and lower revenue per kWh compared to the R-Basic Large class. This would contribute to a higher rate base, higher expenses per kWh, especially for distribution plant, and a lower rate of return.

The lower rate of return for R-Basic compared with R-Basic-XS is likely to be caused by a mix of factors. For example, the load research information shows that the R-Basic class has a higher CP and NCP load relative to the class kWh sales compared with the R-Basic-XS class. This would contribute to a comparatively higher rate base and expenses and a comparatively lower rate of return.

Witness: Leland Snook

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Vote Solar 1.32: Please provide the last two years of metering (hourly interval) data for all residential solar customers, including the data use to determine the cost-of-service for the 2018–2019 test year. If the test year data is different than the data underlying Mr. Snook's Direct Testimony, Exhibit LRS-3DR, please also provide the data underlying Exhibit LRS-3DR. Please provide all data in native, unlocked, electronic format with all functions, formulas, links and cross-references intact.

Response: Please see spreadsheet ExcelAPS19RC00387 attached to the Company's response to SEIA Data Request 3.12.

Witness: Leland Snook

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Vote Solar 1.33: Please reference the "APS Solar Communities Program" (formerly AZ Sun II).

a. Separately for each category (Limited Income, Moderate Income, Multifamily, and Non-profit, Title I Schools, Rural Government), please identify each "install" completed through the date of your response.

b. Separately for each install identified in response to (a), above, please provide the following, including all payments made and internal costs incurred (including internal labor costs):

i. The total rated system capacity in AC;
ii. The total equipment cost;
iii. The total installation cost;
iv. The total engineering and design cost;
v. The total legal and permitting costs;The total expenses, including but not limited to payments or "bill credits" to site host ("participating customer");
vi. Monthly output in kilowatt hours and capacity factor

Response:

a. The table below shows the number of Installations in each category:

Category	Number of Systems
Residential – Limited-income	548
Residential – Moderate income	135
Non-Profit	2
Title I Schools	5
Rural Government	3
Multifamily Communities	2

b. i. Total rated system AC Capacity is shown below:

Category	Aggregate AC Capacity
Residential	3,719 kW
Non-Profit	583 kW
Title I Schools	1,810 kW
Rural Government	1,174 kW
Multifamily Communities	184 kW

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Response to Vote Solar 1.33 (continued):

b. ii-v. APS issued competitive RFPs for overall purchase, design, and installation for APS Solar Communities systems as a total system price and cannot break down the costs into the separate items requested.

Average costs for residential systems and multifamily communities in the program are shown below:

Residential system size	Average Cost
2 kW	$9,558 - $10,645
3 kW	$11,227 - $12,364
4 kW	$11,440 - $12,894
6 kW	$15,720 - $17,158
8 kW	$19,680 - $21,678

Total amount spent on residential systems to date is $9,929,617 in capital cost. Total amount spent on non-residential systems to date is $13,841,658.

Average capital cost for non-profit, Title I schools, and rural government systems are $3,500 to $4,500 per kWac.

Additional APS costs are as follows:

	APS Equipment Cost	Other Internal APS Costs
Non-Profit	$48,556	$46,893
Title I Schools	$250,704	$152,009
Rural Government	$34,855	$112,741

The total amount of bill credit paid out to customers since the beginning of the program is $296,659, which includes all categories of systems.

b. vi. Please see attachment ExcelAPS19RC01394 for the requested information. Please note some of the capacity factors, particularly with the residential sites, may appear low because they are based on the permission to operate dates which may not be the actual dates the systems were turned on. Typically, these dates are very close together, but some deviation may have occurred for a variety of reasons.

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Vote Solar 1.34: Please reference the Direct Testimony of Scott B. Bordenkircher Docket No. E-01345A-16-0036.

a. Please provide each annual "Ops Vision Plan" as referenced on page 4, from January 1, 2017 to present.

b. Provide any reports, analyses, and/or summaries of the field experience and data collected as part of APS's battery storage pilot initiatives described on page 13.

c. Please provide all communications, reports, and presentations to and between members of the Solar Partner Program Advisory Council in the last five (5) years, including but not limited to "feedback on the program design, research methodologies and results" referenced on page 14.

d. Please describe the results of the Solar Partners Program in "validat[ing] the assertion that advanced inverters can mitigate the adverse effects of increased photovoltaics (PV) through enhanced power regulating capabilities, and in what circumstances," prov[ing] that the operational challenges of distributed solar can, in most cases, be effectively managed by configuring advanced inverters and issuing real-time commands," "collect[ing] and analysis of data [to] help anticipate and identify the tools that are the most effective at mitigating the negative impacts of increased PV penetration on the distribution grid" and "validat[ing] and further develop[ing] complex planning models which will improve near- and long-term forecasting" as described on page 15.

e. Please identify the total capital investment in the Solar Partners Program (compared to the estimated $40 million on page 16), total expenses related to the program, and the amount of cost (depreciation, return on capital, and expenses) included in the revenue requirement in this case, and the expected kWh production from all Solar Partner Program equipment during the test year.

f. Innovation Study described on pages 16-17. Please produce any reports, analyses, and/or summaries of the field experience and data collected as part of APS's Solar Innovation Study described on pages 16-17.

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Response to Vote Solar 1.34:

a. The 2017 update presentation of the Company's Ops Vision Plan is attached as APS19RC01335. No additional updates have been presented since that time, although portions of the plan have been separately reviewed. Please see the attached 2020 Power Quality Plan (APS19RC01336) and the 2020 Reliability Technology Plan (APS19RC01337). These documents are Confidential and are being provided pursuant to an executed Protective Agreement.

b. The report "**APS SPP Phase 2: Energy Storage Demonstration Results"** is publicly available from Electric Power Research Institute (EPRI) at this link: https://www.epri.com/research/products/000000003002014455

This is the EPRI final project report that provides lessons learned for utilities and the industry related to the APS battery storage pilot initiative that constitutes Phase 2 of the Solar Partner Program. Various operational modes of the battery, feeder voltage control options including advanced inverter controls, and interoperability between DER and grid device controls were all investigated. The results were summarized in a simple presentation format. The attached document APS19RC01334 summarizes the EPRI report and key findings of the study.

Please note that the EPRI results obtained and the interpretation of those results are independent findings from the research institute. APS technology and engineering staff provided subject matter expertise to interface with the technology, collect the data, and enable the execution of test-cases which are defined in the report.

c. Please see the following Solar Partner Program Advisory Council documents. These documents are Confidential and are being provided pursuant to an executed Protective Agreement.

Advisory Council Presentation	APS19RC01338
Advisory Council Notes	APS19RC01339
Advisory Council Notes	APS19RC01340
Advisory Council Minutes 6-8-15	APS19RC01341
Advisory Council Notes	APS19RC01342
Advisory Council Notes	APS19RC01343
Advisory Council Notes	APS19RC01344
Advisory Council Minutes 12-1-15	APS19RC01345
Advisory Council Agenda	APS19RC01346

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Response to Vote Solar 1.34 (continued):

Advisory Presentations 6-1-17	APS19RC01347
Advisory Council Presentation	APS19RC01348
Advisory Council Presentation	APS19RC01349
Advisory Presentations 6-1-17	APS19RC01350
Advisory Presentations 6-7-16	APS19RC01351
Advisory Presentations 6-8-15	APS19RC01352
Advisory Presentations 12-5-17	APS19RC01353
Advisory Presentations 12-6-16	APS19RC01354
Advisory Council Presentation	APS19RC01355
Advisory Council Presentation	APS19RC01356
Advisory Council Agenda	APS19RC01357
Advisory Council Agenda	APS19RC01358
Advisory Council Agenda	APS19RC01359
Advisory Council Agenda	APS19RC01360
Advisory Council Agenda	APS19RC01361
Advisory Council Agenda	APS19RC01362
Advisory Council Agenda	APS19RC01363
Advisory Council Agenda	APS19RC01364
Advisory Council Agenda	APS19RC01365
Advisory Council Presentation	APS19RC01366
Advisory Council Agenda	APS19RC01367
Advisory Council Presentation	APS19RC01368
Advisory Council Presentation	APS19RC01369
Advisory Council Presentation	APS19RC01370
Advisory Council Presentation	APS19RC01371
Advisory Council Presentation	APS19RC01372
Advisory Council Presentation	APS19RC01373
Advisory Council Presentation	APS19RC01374
Advisory Council Presentation	APS19RC01375
Advisory Presentation 12-1-15	APS19RC01376
Advisory Council Presentation	APS19RC01377
Advisory Council Presentation	APS19RC01378
Advisory Council Presentation	APS19RC01379
Advisory Council Presentation	APS19RC01380
Advisory Group Charter	APS19RC01381
Advisory Council Presentation	APS19RC01382
Advisory Council Presentation	APS19RC01383
Advisory Council Presentation	APS19RC01384
Advisory Council Notes	APS19RC01385

d. APS is aligned with industry developments on advanced inverters, and the Company is actively engaged with industry research in this area. Advanced inverters can help to moderate some of the operational challenges of DG. They do not, however eliminate such challenges.

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Response to Vote Solar 1.34 (continued):

Moreover, many legacy DG systems do not have advanced inverters. Please see a more detailed explanation below.

During the testing period for Phase 1 of the Advanced Inverter Demonstration project with EPRI, APS was among the first utilities in the nation to receive the UL1741SA designation on inverters certified to perform certain advanced inverter functions. Also note that the IEEE 1547-2014 was recently developed and released, and minimal industry standard for advanced inverter designations were available.

The report **"APS SPP: Advanced Inverter Demonstration Results"** is publicly available from EPRI: https://www.epri.com/research/products/000000003002011316. This report provides the background, test cases, and results for the Phase 1 investigation of advanced inverters, inter-operability with existing grid voltage control technologies, and simulated conditions. On Page 2-6 of the report, the "theoretical" hosting capacity limits (which are 4.4 and 2.3 MW) for two actual high penetration feeders (with 3.7 and 2.7 MW at the time of the study) is shown; however, this assumes rooftop solar PV can be ideally located which is not feasible when customers connect PV based on individual choice.

On page 2-7 and 2-8 of the report, hosting capacity results based on actual existing interconnections is displayed. This is explained as "remaining hosting capacity". Results show significant decrease in the both feeders' total ability to interconnect PV. As stated in the report for Feeder 1 (Fig. 2-6): *"However, because the connected PV is currently occupying less ideal locations on the circuit, the maximum remaining hosting capacity is much lower than the theoretical maximum (1.7MW remaining for a total of 5.4MW)."*

For the other feeder displayed, the existing installations already exceed the minimum hosting capacity, and the impact on customer voltage and power quality is confirmed with field measurements and customer AMI meter data that see routing high voltage during high solar PV production periods. Figure 2-7 display "zero actual remaining hosting capacity".

The section starting on page 2.8 titled "Improving Hosting Capacity with Advanced Inverters" specifies results for

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Response to Vote Solar 1.34 (continued):

"simulated only, theoretical cases" that are based on extensions of the actual results obtained. In the first, if only newly added inverters are advanced with voltage control enabled, remaining hosting capacity can increase significantly. For example, if all inverters were advanced inverters, remaining hosting capacity on one feeder can increase from 700 kW to 2.4 MW, or almost triple as seen in Fig. 2-8. The second case assesses that if all inverters were retrofit to have 100% inverters with advanced inverter capability, there is no theoretical voltage limit as seen in Fig. 2-9 (other limits, such as thermal may become the limiting constraint).

However, this result is not similar on the other feeder assessed. On the other feeder, in the first case (future inverters only), remaining hosting capacity remains zero since existing PV induced voltage issues exists as shown in Fig. 2-10. However, if retrofits are accomplished for 100% advanced inverter deployment, then an additional 2.8 MW of DG could be accommodated over the actual existing case as demonstrated in Fig. 2-11.

Various advanced inverter voltage/VAR modes were investigated. A generic Volt/VAR curve was recommended as being the most effective for all scenarios (page xii). Starting on page 2-26, a detailed discussion on advanced inverter and voltage testing is provided which concludes on page 2-43. Field demonstration results are provided.

Some other key challenges identified include:

- Solar PV inverters do not communicate or function during non-PV producing hours, which limits the effectiveness of potential voltage control that may be possible (load is still high after 8 PM).
- Utility voltage control infrastructure is still required due to PV inverter inability to provide VARs after dark.
- Solar PV does not reduce the peak load at the transformer or individual customer locations (i.e. peaks individually are set later in the afternoon) but do provide some reduction to aggregate feeder peak load.
- Ideal settings vary by feeder. Feeders are unique and will have ideal settings. The desire for a single optimal setting can provide benefit, but not optimum performance.

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Response to Vote Solar 1.34 (continued):

- No real-power curtailment was observed since the extreme voltages that would be required to create total inverter shut-off are infrequently observed.
- Also, the possibility of real-power curtailment was minimal even with the most aggressive voltage control settings.

These results have been corroborated and confirmed across various utility service territories, and with multiple technical organizations. Since this report in 2017, the IEEE 1547-2018 Standard for Interconnecting Distributed Energy Resources to the Distribution Systems has been released to the industry.

The discussion of the results above describes SPP findings that validate the assertion that advanced inverters can mitigate the adverse effects of increased photovoltaics (PV) – effects including negative power quality, PV induced voltage-rise, and load-masking, among others. The circumstances discussed where advanced inverters proved useful include PV operation contributing to both high voltage and poor power quality. These are operating challenges exacerbated by high penetrations of solar PV. In testing, active management, or re-issuing of inverter settings, to address actual field measurement concerns was a valuable tool in mitigating operational issues such as PV induced high voltage. Autonomous (i.e. set-and-forget) settings also proved useful. Both active control and autonomous settings can provide tools to ensure the grid remains stable and reliable.

A digital representation of the physical world is required to run predictive models and develop effective mitigation strategies using non-wires alternatives, utility voltage control devices, and customer technologies like inverters. To see impacts such as PV induced voltage rise, understand how much load is masked, and what can result during abnormal operation (switching events, outages and restoration, and feeder protection, and cold-load-pickup), advanced planning models of the circuit, as well as the already interconnected DER, are essential.

APS is also involved in sharing its experiences and advancing the objectives of enabling higher DER penetrations while still maintaining high levels of reliability, safety, and cost-effective sustainable solutions for the end-use customer. Some perspectives of the

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Response to Vote Solar 1.34 (continued):

preeminent technical and research organizations in the DER integration space where APS actively participates include EPRI, NREL and the IEEE.

The Institute for Electrical and Electronics Engineers (IEEE) develops standards for various aspects of power systems, electrical technologies, and communications equipment and infrastructure. IEEE 1547-2018, the global "Standard for Interconnection and Interoperability of Distributed Energy Resources with Associated Electric Power Systems Interfaces", was released in April 2018, and inverters certified to this new standard are anticipated to be available on the market in 2021 and beyond. The IEEE standard may be accessed at the link: https://standards.ieee.org/standard/1547-2018.html.

APS supports the standardization and utilization of advanced inverter capabilities laid out in IEEE 1547-2018 for application to the bulk-electric-system (BES) and to satisfy NERC Reliability Criteria, as well as simultaneously provide Volt/VAR capability as a do-no-harm setting to the distribution infrastructure. APS is under the jurisdiction of the WECC who monitors and sets performance criteria for transmission and power system reliability. NERC developed guidelines on adopting the IEEE 1547-2018, which are publicly available and can be found at this link: https://www.wecc.org/Administrative/Reliability_Guideline_IEEE_1547-2018_BPS_Perspectives.pdf.

An NERC description and explanation of the technical challenges may be summarized in content available at the link: https://www.nerc.com/comm/PC/System%20Planning%20Impacts%20from%20Distributed%20Energy%20Re/IEEE%20SCC21_1547_Overview_NERC_SPIDERWG_01072019.pdf).

Finally, an example of an NREL report on DER integration, **"An Overview of DER Interconnection: Current Practices and Emerging Solutions"**, is available at this link (https://www.nrel.gov/docs/fy19osti/72102.pdf), to which APS was an active and recognized contributor. Section 3 details Advanced Inverter concepts. Section 4 discusses IEEE 1547-2018. Section 5 discusses Strategies and Upgrades for Mitigating the Distribution System Impacts of DER. In Section 3 on utilizing Advanced Inverters for Voltage Regulation, Figure 8 of this report

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Response to Vote Solar 1.34 (continued):

details similar findings to APS's SPP, on non-APS circuits, where voltage control (off-nominal or Volt/VAR) can provide significant improvement to feeder PV hosting capacity, but not in all cases (it worked on 2 feeders, but not on a third). Feeders are unique. In Section 4 the IEEE 1547-2018 advanced inverter functions are discussed with changes in 2018 from prior versions, as well as performance categories as discussed in the NERC documents referenced here. In Section 5, typical DER related impacts, applicable violations, and mitigating solutions are provided in Table 1. All applicable violations are requirements of utilities to provide a safe physical infrastructure that is in the public domain, and acceptable service quality and reliability.

e. Please see the attached spreadsheet ExcelAPS19RC01389 for capital, O&M, and incremental revenue requirements for the Solar Partners Program.

Actual production from SPP systems for the Test Year was 14,352,512 kWh.

f. Please see the Company's response to RUCO 4.1.

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Vote Solar 1.35: Please refer to the Schedule G-7 "Cost of Service Study Development of Allocation Factors" for the test year ending June 30, 2019 spreadsheet.

a. Please define the basis for the calculation used to determine the distribution meter cost allocation for R-Solar TOU, i.e., the $6,338,535 value, in cell 7/AB.

b. For the distribution meter cost allocation, please explain the difference in per-customer costs between R-Solar TOU ($6,338,535 at cell 7/AB) and R-Basic ($6,492,670 at cell 7/AF), in light of the customer account numbers provided in row 5, i.e., for R-Solar TOU 11,382 (cell 5/AB) and for R-Basic 37,377 (cell 5/AF). Please include in your response an explanation for the apparent cost for Solar TOU of $556.89 per customer for R-Solar TOU and $173.71 per customer for R Basic.

Response:

a. Please refer to the Company's responses to SEIA 2.7 and SEIA 11.5.

b. Please refer to part a.

Witness: Leland Snook

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Vote Solar 1.36:

a) Please identify each corporate membership dues paid, each contribution to a non-for-profit entity, and each contribution to an entity that engages in advocacy or public education of any type, that the Company includes in the revenue requirement to be recovered from ratepayers through rates. For purposes of this request, a contribution means cash payment, credit payment or extension of credit, in-kind contribution and/or conveyance of anything of value. This request encompasses, but is not limited to: All dues paid to Electric Power Research Institute, North American Electric Reliability Corporation, Edison Electric Institute, American Coalition for Clean Coal Electricity, Nuclear Energy Institute, American Gas Association, U.S. Chamber of Commerce, Republican Governors Association, Democratic Governors Association, any state legislative leadership committee, Utility Air Regulatory Group, Utility Water Act Group, Waters Advocacy Coalition, Utilities Solid Waste and Activities Group, American Legislative Exchange Council, National Conference of State Legislators, Third Way, Americans for Tax Reform, State Policy Network, Committee for a Constructive Tomorrow, Americans for Prosperity, the Thomas Alva Edison Foundation, and any similar organization(s); and each organization or entity receiving any amount of contribution recorded in account 426.4 "Political and Civil Activities" and account 930.2 "Miscellaneous General Expense."

b) For each contribution or dues identified in response to (a), above, please identify:

i. The total amount of membership dues or contribution.
ii. The amount of membership dues or contribution that is included in the revenue requirement in this case and the portion, if any, that the Company is not seeking to recover through rates.
iii. All services and value received by or accruing to ratepayers as a result of any portion of dues and/or contribution that the Company seeks to recover through rates.
iv. Whether the organization receiving the dues or contribution engages in any form of communication, advocacy, lobbying, litigation, public education and/or advertising paid for through dues and/or contributions.

Response:

a) For a listing of industry and trade association dues that were included in the Test Year, and a description of each entity, please see the Company's responses to Initial 1.33 and SEIA Data Request 1.2.

Witness: Elizabeth Blankenship

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Response to Vote Solar 1.36 (continued):

For additional detail on Edison Electric Institute (EEI) expense and related subcommittee expense, and the amount of dues designated as lobbying, please see the Company's response to Initial 1.41. Dues to the Nuclear Energy Institute in 2019 were $1,878,538, of which $46,713 was designated by NEI as lobbying expense. No dues designated as lobbying have been included in the Test Year.

Also included in the Test Year revenue requirement as recorded in account 930.2 are various Chambers of Commerce dues, memberships, or sponsorships for cities and areas within the APS service territory. These Chambers are engaged primarily in economic development activities, and the related amount of expense for all Chamber dues, memberships, or sponsorships in the Test Year is less than $100,000.

Costs recorded in account 426.4 are not included in rates at any time, including the Test Year in this rate request.

For detailed information on organizations and APS expenses for lobbying, advertising and marketing, and contributions, please see the following letters in response to Commissioner inquiries:

https://docket.images.azcc.gov/0000198676.pdf
https://docket.images.azcc.gov/0000197833.pdf
https://docket.images.azcc.gov/E000007075.pdf

b) This information is provided in the documents cited in part a.

Rodney J. Ross
Manager
State Regulatory Affairs

Mail Station 9708
PO Box 53999
Phoenix, Arizona 85072-3999
Tel 602-250-4944
Rodney.Ross@aps.com

July 17, 2020

Tim Hogan
ACLPI
514 West Roosevelt Street
Pheonix, AZ 85003

RE: Arizona Public Service Company's (APS or Company)
Response to Vote Solar's Third Set of Data Requests
Docket No. E-01345A-19-0236

Dear Mr. Hogan:

Arizona Public Service Company's response to Vote Solar's Third Set of Data Requests in the above docket is available on the APS 2019 Rate Case SharePoint Extranet Site.

Please let me know if you have any questions.

Sincerely,

/s/Rodney Ross

Rodney J. Ross

RJR/bgs

cc: Jennifer Anderson
Sachu Constantine
Eric Woychik

VOTE SOLAR THIRD SET OF DATA REQUESTS TO ARIZONA PUBLIC SERVICE COMPANY REGARDING THE APPLICATION TO APPROVE RATE SCHEDULES DESIGNED TO DEVELOP A JUST AND REASONABLE RATE OF RETURN DOCKET NO. E-01345A-19-0236 JULY 2, 2020

VS 3.1: Please reference your response to VS 1.6(c). Please confirm that the company's cost of service study only allocated costs to inflow loads and that no costs were allocated to customers with DG based on energy flows from the customer to the utility. If exports are used as customer "load" to allocate costs in the cost of service study, please revise your answer.

Response: The demand allocators referenced in VS 1.6.c were based on site load, which excludes exports to the grid. The export energy is handled as described in the Company's response to SEIA 2.6. In addition, the COSS did not include any additional distribution capacity costs that may be attributed to the export power.

Witness: Leland Snook

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VS 3.2: Reference your response to SEIA 2.6(c).

a. Please describe APS's metering methodology for DG customers, including where each meter is located relative to customers' generation and load, the type of meters used, and how "entire load" and APS-served load are calculated for each customer from the meter data.

b. Please confirm that the calculated "credits" described in the response refer to the workpaper "LRS+WP11DR Cost of Service Study Model", tab "Solar Credit", rows 101-121. If not, please specifically identify the correct reference document.

c. Please explain the difference in revenue requirement for solar customers calculated by APS as described in the response and calculating a revenue requirement by allocating costs to APS delivered load, including both (i) the revenue requirement for production, transmission, and distribution under each method foreach solar subclass and (ii) why APS's method better "captures the cost of providing grid services for the rooftop solar customer's export of energy and backup of the customer's self-supplied generation, including support for the starting of motors (e.g. the in-rush current associated with the starting of an air conditioning unit, which generally cannot be met by a solar array)," as stated in SEIA 2.6(b).

d. For each customer class or subclass, other than residential, that contains customers who self-generate some of their electricity requirements (e.g., commercial customers with solar), identify how many of such customers are in the class or subclass, how many were included in the load sample data for that class or subclass, whether APS's cost of service analysis allocated costs to those customers' "entire load" and, if not, the effect of those customers' generation on cost allocation to their class or subclass.

Response: a. APS uses a bidirectional meter that records delivered energy (APS supply to customer) and received energy (customer exports to the grid) as well as a generation meter that records the output of the solar generator. The hourly site load is derived as: Delivered + [Generation – Received]. For additional meter information please refer to the

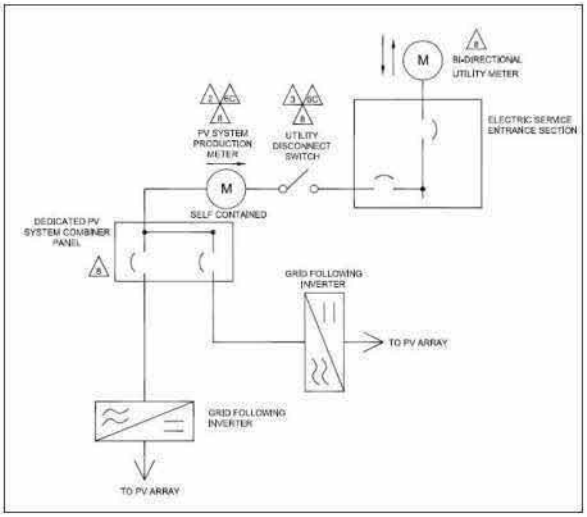
VOTE SOLAR THIRD SET OF DATA REQUESTS TO ARIZONA PUBLIC SERVICE COMPANY REGARDING THE APPLICATION TO APPROVE RATE SCHEDULES DESIGNED TO DEVELOP A JUST AND REASONABLE RATE OF RETURN DOCKET NO. E-01345A-19-0236 JULY 2, 2020

Response to Vote Solar 3.2 (continued):

Company's response to SEIA 2.7.

Per Section 9.2 of the APS interconnection requirements manual, APS installs utility-grade metering to measure the output of the generation as close to the main billing meter as practically possible (aka production metering). The location of the generation relative to the metering varies depending on customer preference, site layout and access. APS requires 24-7 access to all metering and isolation on the customer side. APS would require the utility disconnect and production meter to be located within the same workspace (within 10 feet) and adjacent to the billing meter (i.e. service entry point, point of delivery, point of interconnection, etc.). For a larger plant, residential site, or commercial/industrial customer the layout could vary depending based on where equipment is located, meeting APS access/workspace safety requirements and customer/developer design preference.

Please see the below graphic for the typical meter setup for service with solar.



b. Confirmed.

c. Please see the Company's response to SEIA 15.1.

d. Please see the attached spreadsheet ExcelAPS19RC01578. Note that it lists the number of total APS non-residential customers with third-party solar generation as of June 2019, whereas the number of solar non-residential customers in

VOTE SOLAR THIRD SET OF DATA REQUESTS TO ARIZONA PUBLIC SERVICE COMPANY REGARDING THE APPLICATION TO APPROVE RATE SCHEDULES DESIGNED TO DEVELOP A JUST AND REASONABLE RATE OF RETURN DOCKET NO. E-01345A-19-0236 JULY 2, 2020

Response to Vote Solar 3.2 (continued):

the Load Research Report reflects the total number during the Test Year.

The non-residential solar customers were not separated into separate classes, but rather included in their associated rate classes. Therefore, the cost allocation was based on delivered load, not the site load and credit method used for residential solar classes. The different treatment is due to the relatively low number of non-residential solar customers and the predominant recovery of fixed costs through demand charges for non-residential classes, among other differences.

VOTE SOLAR THIRD SET OF DATA REQUESTS TO ARIZONA PUBLIC SERVICE COMPANY REGARDING THE APPLICATION TO APPROVE RATE SCHEDULES DESIGNED TO DEVELOP A JUST AND REASONABLE RATE OF RETURN DOCKET NO. E-01345A-19-0236 JULY 2, 2020

VS 3.3: Reference your response to VS 1.7.

a. For each of the peak loads identified in your response to VS 1.7(a), please identify the total contribution to that peak load from residential customers without solar, residential customers with solar, and non-residential customers.

b. Please confirm that the number of residential and non-residential customers identified in your response to VS 1.7(c), in the attachment named "Vote Solar 1.7_ExcelAPS19RC01391_DG at Dist Substations," are only the customers with distributed generation.

c. Please produce the total number of residential customers without DG and the total number of non-residential customers without DG at each of the substations identified in your response to VS 1.7.

Response:

a. APS does not have the data requested. The data provided are net values (after solar production has reduced demand). A general observation is that 10-20% of installed rooftop PV capacity is producing when the system peaks occur between 15:00 – 18:00, which most of the data represent.

b. Confirmed. Only customers known to have distributed generation were provided.

c. The total customer meter counts for each substation have been appended to the data set and attached as ExcelAPS19RC01593. Classification of residential or non-residential could not be determined in the response period. Note that the data represent customer meters and not individual customer accounts.

Witness: Leland Snook

VOTE SOLAR THIRD SET OF DATA REQUESTS TO ARIZONA PUBLIC SERVICE COMPANY REGARDING THE APPLICATION TO APPROVE RATE SCHEDULES DESIGNED TO DEVELOP A JUST AND REASONABLE RATE OF RETURN DOCKET NO. E-01345A-19-0236 JULY 2, 2020

VS 3.4: Reference your response to VS 1.29(d).

a. Please identify the APS delivered load for each solar customer during the 4 CP hours during the test year, the kWh charges for each solar customer, and the ratio of kWh charges to load during 4CP hours for each solar customer.

b. Identify each individual non-solar residential customer that has a ratio of kWh charges to load during the 4CP hours that falls within, or below, the range of solar customers' ratios provided in response to (a), above.

Response:

a. The Company has not performed this analysis. However, the production cost per kWh for each class is provided in the company's response to Kroger 1.2 and the kWh revenue for each class is provided in workpaper JEH-WP1DR. In addition, the comparison in parts a and b would not be valid because the delivered CP ignores the additional costs incurred for solar customers discussed in the Company's response to SEIA 15.1.

b. Please refer to the Company's response to part a.

Witness: Leland Snook

VOTE SOLAR THIRD SET OF DATA REQUESTS TO ARIZONA PUBLIC SERVICE COMPANY REGARDING THE APPLICATION TO APPROVE RATE SCHEDULES DESIGNED TO DEVELOP A JUST AND REASONABLE RATE OF RETURN DOCKET NO. E-01345A-19-0236 JULY 2, 2020

VS 3.5: Please reference your response to VS 1.33

a. Please explain the difference, if any, between the "capital costs" and the "APS Equipment Costs," including what costs are APS equipment costs but are not "capital costs."

b. Please provide the "Other Internal APS Costs" for the residential category.

c. Please itemize the "Other Internal APS Costs" for all categories (including residential).

d. Please provide the installed capacity, by month, for the residential and non-residential categories (specifying whether AC or DC). This appears to be used to calculate the capacity factor but does not appear to be provided in the response.

e. Please provide, separately for residential and non-residential categories, the levelized cost of energy from the generation installed through the "APS Solar Communities Program" including both capital and non-capital costs of the program and expected production over the expected life of the equipment. Please provide all workpapers and calculations, including all inputs used, in determining the levelized cost.

Response:

a. There is no difference between capital costs and APS equipment costs.

b. The Other APS Internal Costs for residential installations would include payroll, payroll loads (benefits and payroll taxes), and clearing allocations.

c. Other APS Internal Costs for the non-residential and multifamily categories includes payroll, payroll loads (benefits and payroll taxes), and clearing allocations.

d. Please see attached spreadsheet ExcelAPS19RC01580.

e. APS does not routinely calculate levelized costs for APS-owned assets, rather a revenue requirement calculation is performed. Please see the attached spreadsheet ExcelAPS19RC01594 for the AZ Solar Communities revenue requirement for the Test Year.

Witness: Elizabeth Blankenship

VOTE SOLAR THIRD SET OF DATA REQUESTS TO ARIZONA PUBLIC SERVICE COMPANY REGARDING THE APPLICATION TO APPROVE RATE SCHEDULES DESIGNED TO DEVELOP A JUST AND REASONABLE RATE OF RETURN DOCKET NO. E-01345A-19-0236 JULY 2, 2020

VS 3.6: Please reference your response to VS 1.34 and attachment Vote Solar 1.34_ExcelAPS19RC01389_SPP Rev Req. Capital O_M. Please itemize the "Solar Partner Program-Rooftop Non-Land Charges"

Response: The table below summarizes Solar Partner Program-Rooftop Non-Land Charges by resource category.

111 - Straight Time Non-Management	$1,813
113 - Allowed Time Load	$326
121 - Overtime	$389
131 - Premium and Other	$18
899 - Other Exps-General*	$597,179
902 - Payroll Tax load	$178
903 - Injuries & Damages Load	$21
911 - Benefits Load	$791
TOTAL	$600,718

*Category 899 represents payments to customers for their participation in the Solar Partner Program.

Witness: Elizabeth Blankenship

VOTE SOLAR THIRD SET OF DATA REQUESTS TO ARIZONA PUBLIC SERVICE COMPANY REGARDING THE APPLICATION TO APPROVE RATE SCHEDULES DESIGNED TO DEVELOP A JUST AND REASONABLE RATE OF RETURN DOCKET NO. E-01345A-19-0236 JULY 2, 2020

VS 3.7: Reference "LRS_WP11DR Cost of Service Study Model", Tab "Locked Case", row 38 "Operating Income."

a. Please specify for the residential solar subclasses, whether the income attributed to the customers in that subclass is net of credits for customer exports.

b. If the income attributed to solar customers is net of credits for exports, please itemize for each customer subclass the amount by which income was reduced due to credits for exports.

Response:

a. The operating income for the solar classes includes the cost-of-service credits for export energy as described in the Company's response to SEIA 2.6. While the solar class revenue reflects bill reductions from exported energy that is net metered and billed under base rates, it excludes exported energy that is purchased by the Company under an RCP rate or the annual purchase of excess energy under the net metering program. The latter are energy purchases and, therefore, not part of base revenue in the COSS.

b. The Company has not performed this specific analysis. However, the allocation for all solar energy credits, including export energy, is provided in the COSS model, COS tab, row 930.

Witness: Leland Snook

VOTE SOLAR THIRD SET OF DATA REQUESTS TO ARIZONA PUBLIC SERVICE COMPANY REGARDING THE APPLICATION TO APPROVE RATE SCHEDULES DESIGNED TO DEVELOP A JUST AND REASONABLE RATE OF RETURN DOCKET NO. E-01345A-19-0236 JULY 2, 2020

VS 3.8: Please reference your response to Initial 1.33, VS 1.36 and SEIA 1.2.

a. VS 1.36 requested contributions beyond association membership dues and specifically included in-kind contributions. Please clarify whether the response to Initial 1.31 and SEIA 1.2 includes all contributions (not limited to membership dues) and includes like kind contributions.

b. Please specify the definition of "lobbying" applied by the Edison Electric Institute and Nuclear Energy Institute for purposes of designating the amount of dues used for lobbying.

c. For each contribution or membership dues, any portion of which is included in the Test Year, please specify: the total amount of contribution or dues; the portion included in the Test Year; the portion excluded from the Test Year; and the basis for the division between included and not-included in the Test Year.

d. Please provide all evidence, if any, that the amount of contributions included in the revenue requirement, cash or in-kind, to any entity other than the industry associations already identified, but which takes any advocacy position or undertakes any "advertising" within the meaning of 16 U.S.C. § 2625(h).

e. Please identify the recipients of the funds, and itemize the contribution, for each organization included in the "Other" category.

Response: a. Initial 1.33, Initial 1.41, VS 1.36, Staff 15.8 and SEIA 1.2 all provide details of industry association dues recoverable as operating expense. Any contributions not recoverable were broken out and noted as lobbying or below-the-line. Costs recorded in account 426.4 are not included in rates at any time, including the Test Year in this rate request.

For detailed information on organizations and APS expenses for lobbying, advertising and marketing, and contributions, please see the following letters in response to Commissioner inquiries:

https://docket.images.azcc.gov/0000198676.pdf
https://docket.images.azcc.gov/0000197833.pdf
https://docket.images.azcc.gov/E000007075.pdf

b. Edison Electric Institute and the Nuclear Energy Institute refer to "lobbying" as "influencing legislation" for the purposes of designating the amount of dues used for lobbying.

Witness: Elizabeth Blankenship

VOTE SOLAR THIRD SET OF DATA REQUESTS TO ARIZONA PUBLIC SERVICE COMPANY REGARDING THE APPLICATION TO APPROVE RATE SCHEDULES DESIGNED TO DEVELOP A JUST AND REASONABLE RATE OF RETURN DOCKET NO. E-01345A-19-0236 JULY 2, 2020

VS 3.8 Response (continued):

c. Please refer to Initial 1.33, Initial 1.41, VS 1.36 and SEIA 1.2. All provide details of industry association dues recoverable as operating expense. Any contributions not recoverable were broken out and noted as lobbying or below-the-line.

d. Please refer to Initial 1.29 for a list of Test Year advertising expense. Please also refer to Initial 1.51 for a list of outside services expenses over or under $20,000. Advertising costs that were excluded are also listed in the pro-forma to be excluded from FERC 9301. An updated copy can be viewed in the Company's response to Staff 5.7.

Costs recorded in account 426.4 for political advertising expenses or contributions are not included in rates at any time, including the Test Year in this rate request.

e. Please see the table below.

Industry Association Dues			
Center for Energy Workforce Development	9200000	$	6,250
Edison Electric Institute	5930000	$	2,500
Electric Power Research Institute	5460000	$	9,100
Mingus Mountain Improvement Association	9350000	$	148
North American Energy Standards Board	5600000	$	7,000
State of Arizona	5800000	$	50
Whitman Requardt and Associates LLP	9200000	$	315
CEATI International Inc	5620000	$	8,500
Arizona Energy Consortium	9160000	$	5,000
Association of Energy Engineers	5490000	$	215
WREGIS	5490000	$	125
ACORE	5490000	$	7,500
Kingman Area User Association	9350000	$	671
Mount Elden Users Association	9350000	$	750
Bill Williams Mountain Improvement Association	9350000	$	1,500
Smith Peak Improvement Association	9350000	$	950
White Tanks Mtn Improvement Association	9350000	$	3,500
Directions on Microsoft	9200000	$	5,433
CN Utility Consulting Inc	5930000	$	1,000
American Electric Power	5800000	$	400
Common Ground Alliance	5940000	$	2,500
Grand Total		$	63,407

Witness: Elizabeth Blankenship

Rodney J. Ross
Manager
State Regulatory Affairs

Mail Station 9708
PO Box 53999
Phoenix, Arizona 85072-3999
Tel 602-250-4944
Rodney.Ross@aps.com

April 10, 2020

Maureen A. Scott
Legal Division
Arizona Corporation Commission
1200 West Washington Street
Phoenix, Arizona 85007

RE: Arizona Public Service Company (APS or Company)
Response to Staff's Ninth Data Request
Docket No. E-01345A-19-0236

Dear Ms. Scott:

Arizona Public Service Company's responses to Staff's Ninth Set of Data Requests, all except parts c and d of question 28, which will be provided as soon as available, in the above-referenced docket are available on the APS 2019 Rate Case SharePoint Extranet Site. Please note some of these responses are Confidential and Highly Confidential and are being provided pursuant to an executed Protective Agreement in this case.

Please let me know if you have any questions.

Sincerely,

/s/Rodney Ross

Rodney J. Ross

RJR/bgs

cc: Matthew Connolly
Stephen Emedi
Robert W. Geake
Michael Deupree
David Dismukes

ARIZONA CORPORATION COMMISSION STAFF'S NINTH SET OF DATA REQUESTS TO ARIZONA PUBLIC SERVICE COMPANY REGARDING THE APPLICATION TO APPROVE RATE SCHEDULES DESIGNED TO DEVELOP A JUST AND REASONABLE RATE OF RETURN DOCKET NO. E-01345A-19-0236 MARCH 25, 2020

Staff 9.1: Describe all differences and provide a reconciliation of the differences between the billing determinants used in the Company's Class Cost of Service Study ("CCOSS"), Jurisdictional Cost of Service Study ("JCOS"), revenue allocation, and proposed rate design. Provide all workpapers and source documents supporting the Company's response in electronic form, with all spreadsheet links and formulas intact, source data used, and all assumptions and calculations explained. To the extent the data requested is not available in the form requested, provide the information in the form that most closely matches what has been requested.

Response: There is no difference in billing determinants used in the Class Cost of Service Study, the Jurisdictional Cost of Service Study, and the allocation and functionalization of costs.

The Proof of Revenue (calculating rate design) billing determinants are different from the other three studies in three ways:

- The Proof of Revenue does not include kWh for customers served under E-36 XL, customers in Mexico, and customers in New Mexico.
- For solar customers, the Proof of Revenue uses billed kWh while the CCOSS and JCOS use site kWh.
- Unbilled kWh is added to the billing determinants of the Proof of Revenue, while the CCOSS and JCOS do not include unbilled kWh.

Witness: Leland Snook and Jessica Hobbick

ARIZONA CORPORATION COMMISSION STAFF'S NINTH SET OF DATA REQUESTS TO ARIZONA PUBLIC SERVICE COMPANY REGARDING THE APPLICATION TO APPROVE RATE SCHEDULES DESIGNED TO DEVELOP A JUST AND REASONABLE RATE OF RETURN DOCKET NO. E-01345A-19-0236 MARCH 25, 2020

Staff 9.2: Please specify whether the Company considered using any other estimation methodologies as part of its jurisdictional or class cost of service studies. For each event listed, please provide a detail narrative explaining how the methodology was evaluated and the factors that led to its exclusion.

Response: APS used allocation methods consistent with those adopted by the Commission in prior rate cases. No other methods were assessed.

Witness: Leland Snook

ARIZONA CORPORATION COMMISSION STAFF'S NINTH SET OF DATA REQUESTS TO ARIZONA PUBLIC SERVICE COMPANY REGARDING THE APPLICATION TO APPROVE RATE SCHEDULES DESIGNED TO DEVELOP A JUST AND REASONABLE RATE OF RETURN DOCKET NO. E-01345A-19-0236 MARCH 25, 2020

Staff 9.3: For the purposes of this request, please refer to Company workpapers "LRS_WP11DR Cost of Service Study Model" and "JEH-WP1DR Proof of Revenue," where there is a discrepancy between the calculated revenue requirement amounts. Using workpaper "LRS_WP11DR Cost of Service Study Model," the required incremental revenue increase for the ACC Jurisdiction can be calculated as $68,593,155 by subtracting the difference of the Base Revenues ($3,279,190,945) and the Total Revenue Requirement ($3,347,784,100). However, this subtotal ($68,593,155) does not agree with the required revenue increase ($68,591,000), as is listed on workpaper "JEH-WP1DR Proof of Revenue". Please provide clarification regarding this discrepancy.

Response: Minor differences between the revenue deficiency in the Cost of Service Study and the Standard Filing Requirements, such as the one noted in the question, are due to differences in rounding methodologies. Rounding differences are typical due to the amount of data included in rate cases, and the amount reflected in Schedule A-1 is used as a final revenue requirement.

Witness: Leland Snook and Jessica Hobbick

ARIZONA CORPORATION COMMISSION STAFF'S NINTH SET OF DATA REQUESTS TO ARIZONA PUBLIC SERVICE COMPANY REGARDING THE APPLICATION TO APPROVE RATE SCHEDULES DESIGNED TO DEVELOP A JUST AND REASONABLE RATE OF RETURN DOCKET NO. E-01345A-19-0236 MARCH 25, 2020

Staff 9.4: For the purposes of this request, please refer please refer to the Direct Testimony of Leland R. Snook, page 12, lines 6 through 14, where the Company's allocation of distribution plant is discussed.

a. Please provide an explanation of how the Company allocates costs associated with customer-related distribution plant facilities.

Response: Customer-related distribution plant facility costs are allocated using customer counts weighted by the typical cost for a particular distribution service, such as overhead service, underground service, or meters. Additional detail is provided in workpaper LRS_WP4DR.

Witness: Leland Snook

ARIZONA CORPORATION COMMISSION STAFF'S NINTH SET OF DATA REQUESTS TO ARIZONA PUBLIC SERVICE COMPANY REGARDING THE APPLICATION TO APPROVE RATE SCHEDULES DESIGNED TO DEVELOP A JUST AND REASONABLE RATE OF RETURN DOCKET NO. E-01345A-19-0236 MARCH 25, 2020

Staff 9.5: For the purposes of this request, please refer to the Direct Testimony of Jeffrey B. Guldner, page 8 lines 16-19, where he states:

Cool Rewards launched in 2018, and in the summer season of 2019 one of the events resulted in a significant reduction in load of over 18 MW. As we continue to promote this program, APS believes that more customers will recognize its benefits and will contribute to reducing peak load even further.

a. Please provide a copy of the Commission decision approving the creation of the Cool Rewards program.

b. Please provide all analyses since the creation of the Cool Rewards program that examine the load reduction effect created by the program.

c. Provide all workpapers and source documents supporting the Company's response in electronic form, with all spreadsheet links and formulas intact, source data used, and all assumptions and calculations explained. To the extent the data requested is not available in the form requested, provide the information in the form that most closely matches what has been requested.

Response: a. The Cool Rewards program (included as a component of the 'Demand Response, Energy Storage and Load Management Initiative') was approved in Decision No. 76314. A copy of the Decision is provided as Attachment APS19RC01183.

b. Guidehouse Consulting has analyzed the data from Cool Rewards participants to determine the load reduction effect created by the program. Results from summer 2019 indicate an average load impact of 1.2 kW per thermostat over all event hours with a maximum hourly impact of 2.3 kW per thermostat. During this period the program provided a maximum hourly impact of 27 MWs of aggregated demand savings.

c. The 2018 and 2019 Cool Rewards season evaluation reports from Guidehouse Consulting, are provided as attachments APS19RC01167 and APS19RC01168. These documents are Confidential and are being provided pursuant to an executed Protective Agreement in this case.

Witness: TBD

ARIZONA CORPORATION COMMISSION STAFF'S NINTH SET OF DATA REQUESTS TO ARIZONA PUBLIC SERVICE COMPANY REGARDING THE APPLICATION TO APPROVE RATE SCHEDULES DESIGNED TO DEVELOP A JUST AND REASONABLE RATE OF RETURN DOCKET NO. E-01345A-19-0236 MARCH 25, 2020

Staff 9.6: For the purposes of this request, please refer to the Direct Testimony of Leland R. Snook, page 3 lines 1 through 5, where it is stated:

After APS's prior rate case, concerns were expressed over the delayed reset of the lost fixed cost recovery (LFCR) mechanism. Therefore, as part of this rate case, APS is proposing to leave the portion of the lost fixed costs presently collected in the LFCR mechanism, in the amount of $39,792,000 (ACC Jurisdiction), within that mechanism rather than transferring it to base rates.

a. Please provide, by rate class, monthly retail LFCR revenues since the Company's prior rate case.

b. Please provide monthly jurisdictional and non-jurisdictional LFCR revenues since the Company's prior rate case.

c. Provide all workpapers and source documents supporting the Company's response in electronic form, with all spreadsheet links and formulas intact, source data used, and all assumptions and calculations explained. To the extent the data requested is not available in the form requested, provide the information in the form that most closely matches what has been requested.

Response: a. Please see the table below for monthly revenue collected from customers through the LFCR adjustment for the years 2017 through 2019. Please also see the Plan of Administration for the LFCR, included in the Company's Application and available at the APS 2019 Rate Case Extranet Site.

	LFCR Adjustment Billed Revenue		
Month	**2017**	**2018**	**2019**
January	$ 3,047,060	$ 4,197,068	$ 4,599,781
February	$ 2,747,988	$ 3,750,234	$ 4,045,536
March	$ 2,738,313	$ 3,824,764	$ 4,067,385
April	$ 3,462,921	$ 3,970,233	$ 3,938,804
May	$ 4,600,008	$ 4,461,722	$ 4,339,212
June	$ 6,277,049	$ 5,487,748	$ 4,969,161
July	$ 7,931,639	$ 6,657,507	$ 4,743,382
August	$ 7,325,648	$ 6,959,413	$ 4,260,678
September	$ 6,793,995	$ 6,576,900	$ 4,303,837
October	$ 5,132,515	$ 5,175,275	$ 3,078,121
November	$ 4,204,524	$ 4,024,662	$ 2,508,972
December	$ 4,038,083	$ 3,971,237	$ 2,481,927
Total	**$ 58,299,742**	**$ 59,056,763**	**$ 47,336,797**

Witness: Leland Snook

ARIZONA CORPORATION COMMISSION STAFF'S
NINTH SET OF DATA REQUESTS TO
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THE APPLICATION TO APPROVE RATE SCHEDULES DESIGNED TO
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Response to Staff 9.6 (continued):

b. As the LFCR adjustment mechanism applies only to Commission-jurisdictional revenues, no non-jurisdictional revenues are included.

c. Please see the following attached spreadsheets which contain APS's LFCR filings. The mechanism contains a balancing account to ensure that revenues collected are equal to the lost fixed costs.

2018 LFCR Workpapers (for Year 2017)	ExcelAPS19RC01171
2019 LFCR Workpapers (for Year 2018)	ExcelAPS19RC01172
2020 LFCR Workpapers (for Year 2019)	ExcelAPS19RC01173

ARIZONA CORPORATION COMMISSION STAFF'S NINTH SET OF DATA REQUESTS TO ARIZONA PUBLIC SERVICE COMPANY REGARDING THE APPLICATION TO APPROVE RATE SCHEDULES DESIGNED TO DEVELOP A JUST AND REASONABLE RATE OF RETURN DOCKET NO. E-01345A-19-0236 MARCH 25, 2020

Staff 9.7: Adjustor Mechanisms

a. Please list all adjustor mechanisms employed by the Company, including a short description of their use.

b. Please provide current and test year balances associated with each adjustment listed in response to (a).

c. Please list all adjustor mechanisms whose current revenue the Company proposes to transfer into base rates in the current proceeding.

d. Provide all workpapers and source documents supporting the Company's response in electronic form, with all spreadsheet links and formulas intact, source data used, and all assumptions and calculations explained. To the extent the data requested is not available in the form requested, provide the information in the form that most closely matches what has been requested.

Response: a. The Company's currently effective adjustment clauses are described in comments filed by APS in Docket No. AU-00000A-19-0080 on December 20, 2019. These comments can be found at this link:
https://docket.images.azcc.gov/E000004199.pdf

b. Please refer to workpapers EAB-WP20DR and EAB-WP25DR for Test Year adjustor balances. Please refer to the table below for year-end 2019 adjustor balances.

2019 Year-End Adjustor Balances			
Adjustor	**Billed**	**Unbilled**	**Total**
RES	72,730,862	(741,240)	71,989,622
DSM	26,502,089	238,609	26,740,698
EIS	5,872,976	179,863	6,052,839
LFCR	43,022,537	-	43,022,537
TCA	31,956,645	289,759	32,246,404
PSA	49,965,254	(3,035,989)	46,929,265
TEAM Ph I	(114,367,035)	(4,633,628)	(119,000,663)
TEAM Ph II	(66,440,741)	(3,482,598)	(69,923,339)
TEAM Ph III	(67,631,874)	(1,340,654)	(68,972,528)

c. APS has proposed to transfer TEAM Phase I and III in their entirety, and portions of RES and EIS into base rates. Please also refer to EAB-WP20DR.

d. Please see the Company's responses to parts a and b.

Witness: Leland Snook

ARIZONA CORPORATION COMMISSION STAFF'S NINTH SET OF DATA REQUESTS TO ARIZONA PUBLIC SERVICE COMPANY REGARDING THE APPLICATION TO APPROVE RATE SCHEDULES DESIGNED TO DEVELOP A JUST AND REASONABLE RATE OF RETURN DOCKET NO. E-01345A-19-0236 MARCH 25, 2020

Staff 9.8: Demand Allocators.

a. Please list all demand allocation factors used by the Company in its Jurisdictional Cost of Service Study.

b. Please list all demand allocation factors used by the Company in its Class Cost of Service Study.

c. For each allocation factor listed in response to (a) and (b) above, provide all workpapers used to calculate the referenced factor.

d. Provide all workpapers and source documents supporting the Company's response in electronic form, with all spreadsheet links and formulas intact, source data used, and all assumptions and calculations explained. To the extent the data requested is not available in the form requested, provide the information in the form that most closely matches what has been requested.

Response:

a. Please refer to workpaper LRS_WP4DR.

b. Please see the Company's response to part a.

c. Please see the Company's response to part a.

d. Please see the Company's response to part a.

Witness: Leland Snook

ARIZONA CORPORATION COMMISSION STAFF'S NINTH SET OF DATA REQUESTS TO ARIZONA PUBLIC SERVICE COMPANY REGARDING THE APPLICATION TO APPROVE RATE SCHEDULES DESIGNED TO DEVELOP A JUST AND REASONABLE RATE OF RETURN DOCKET NO. E-01345A-19-0236 MARCH 25, 2020

Staff 9.9: Jurisdictional and Class Cost of Service Studies.

a. Please identify all changes to the Company's proposed Jurisdictional Cost of Service Study from the Company's proposal in the Company's prior rate case.

b. Please identify all changes to the Company's proposed Class Cost of Service Study from the Company's proposal in the Company's prior rate case.

c. Please provide a detail narrative explaining the Company's rationale for the proposed changes listed in response to (a).

d. Please provide a detail narrative explaining the Company's rationale for the proposed changes listed in response to (b).

e. Please provide the requested documents in electronic form with all spreadsheet links and formulas intact, source data used, and explain all assumptions and calculations used. To the extent the data requested is not available in the form requested, provide the information in the form that most closely matches what has been requested.

Response:

a. The Company has proposed the following changes to the cost-of-service study in this proceeding, required by the Settlement Agreement as approved by Decision No. 76295:

- A new COS model has been implemented;
- Production capacity costs have been allocated using 4 CP within the residential classes; and
- Several new rate classes have been added including AG-X and solar legacy classes.

The Company has also proposed a new agricultural irrigation rate.

b. Please see the Company's response to part a.

c. Please see the Company's response to part a.

d. Please see the Company's response to part a.

e. The cost-of-service study is provided as LRS-WP11DR and is available on the APS 2019 Rate Case Extranet Site.

Witness: Leland Snook

ARIZONA CORPORATION COMMISSION STAFF'S NINTH SET OF DATA REQUESTS TO ARIZONA PUBLIC SERVICE COMPANY REGARDING THE APPLICATION TO APPROVE RATE SCHEDULES DESIGNED TO DEVELOP A JUST AND REASONABLE RATE OF RETURN DOCKET NO. E-01345A-19-0236 MARCH 25, 2020

Staff 9.10: For the purposes of this question, please refer to the Direct Testimony of Leland R. Snook, page 10, lines 23 through 25, where it is stated that the use of a 4 Coincident Peak ("4CP") cost allocation method to allocate production-related assets in a Jurisdictional Cost of Service Study has been accepted by the Commission for "many years."

a. Please define what is meant by the phrase "many years."

b. Please identify all Decisions the Commission has issued that have accepted a 4CP cost allocation of production-related assets within a Jurisdictional Cost of Service Study.

Response:

a. In this case, "many years" means a minimum of 35 years or more.

b. In Decision No. 53615 (June 27, 1983), the Commission explicitly approved APS's embedded cost of service study, which allocated cost based on the four-months coincident peak (4CP) demand allocation methodology. Each APS rate case since that time has used the 4CP allocation methodology:

Decision No. 53761 (September 30, 1983)
Decision No. 53909 (January 30, 1984)
Decision No. 54204 (October 11, 1984)
Decision No. 54247 (November 28, 1984)
Decision No. 55228 (October 9, 1986)
Decision No. 55931 (April 1, 1988)
Decision No. 57649 (December 6, 1991)
Decision No. 58644 (June 1, 1994)
Decision No. 59601 (April 24, 1996)
Decision No. 60216 (May 23, 1997)
Decision No. 61103 (August 28, 1998)
Decision No. 61973 (October 1, 1999)
Decision No. 67744 (April 7, 2005)
Decision No. 69663 (June 28, 2007)
Decision No. 70667 (December 24, 2008)
Decision No. 71448 (December 30, 2009)
Decision No. 73183 (May 24, 2012)
Decision No. 76295 (August 18, 2017)

Witness: Leland Snook

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Staff 9.11: For the purposes of this question, please refer to the Direct Testimony of Leland R. Snook, page 11, lines 1 through 12, where the Company's Average and Excess Demand ("AED") cost allocation method is discussed.

a. Please provide a detailed narrative explaining why the Company believes that class Non-Coincident Peak ("NCP") is an appropriate allocation factor to attribute to the demand-classified portion of production costs for jurisdictional customer classes.

b. Please provide all workpapers used to calculate the Company's AED cost allocation factor.

c. Please provide all workpapers used to calculate the Company's NCP allocation factor.

d. Please provide all workpapers used to calculate the Company's average energy allocation factor.

e. Provide all quantitative studies and underlying workpapers of regional and jurisdictional customer class load diversity of hourly use of the Company's production plant facilities.

f. Provide all workpapers and source documents supporting the Company's response in electronic form, with all spreadsheet links and formulas intact, source data used, and explain all assumptions and calculations used. To the extent the data requested is not available in the form requested, provide the information in the form that most closely matches what has been requested.

Response:

a. The NCP is used in the average and excess allocator, consistent with industry standards, including the NARUC Cost Allocation Manual, because if the CP is used, the allocator will mathematically reduce solely to a CP allocator.

b. Please refer to workpaper LRS_WP4DR.

c. Please see the Company's response to part b.

d. Please see the Company's response to part b.

e. The load information necessary to assess diversity factors is provided in the Company's response to Initial 1.31.

Witness: Leland Snook

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Staff 9.12: For the purposes of this question, please refer to the Direct Testimony of Leland R. Snook, page 11, line 26 to page 12, line 4, where the following is stated:

Transmission plant was directly assigned to the non-ACC jurisdictional portion of the COSS. A portion of transmission costs are brought back into the ACC jurisdictional cost of service to offset the existing Open Access Transmission Tariff (OATT) revenues. Such an offset ensures that there is no double-counting of transmission costs between the ACC and non-ACC jurisdictions, and effectively assumes that each customer class pays the cost of transmission service.

a. Please provide the test year OATT revenues that were included as an offset in the Jurisdictional Cost of Service Study.

b. Please provide OATT revenues by month for the years 2015 through 2019, and 2020 to date.

c. Please provide a detailed narrative explaining what is meant by "a portion" of transmission costs assigned to non-ACC jurisdictional customers being offset through OATT revenues.

d. Provide all workpapers and source documents supporting the Company's response in electronic form, with all spreadsheet links and formulas intact, source data used, and explain all assumptions and calculations used. To the extent the data requested is not available in the form requested, provide the information in the form that most closely matches what has been requested.

Response:

a. Please refer to the attached spreadsheet ExcelAPS19RC01197.

b. Please refer to the attached spreadsheet ExcelAPS19RC01198.

c. The retail costs for transmission service are equal to the Test Year transmission revenue from the OATT.

d. Please see the Company's response to parts a and b.

Witness: Leland Snook

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Staff 9.13: For the purposes of this question, please refer to the Direct Testimony of Leland R. Snook, page 12, lines 6 through 14, where it is stated:

> Distribution plant, unlike production and transmission plant, is generally designed to meet a customer class's peak load, which may or may not coincide with the system peak load. Thus, costs related to distribution substations and primary distribution lines are allocated based on NCP loads. Allocation of costs related to distribution transformers and secondary distribution lines are based on the summation of the individual peak loads or demands of all customers within a particular customer class (Sum of Individual Max). Each of these allocation methods has traditionally been used by APS and accepted by the Commission for many years.

a. Please define what is meant by the phrase "many years."

b. Please identify all Decisions the Commission has issued that have accepted a NCP cost allocation of distribution substation and primary distribution line assets within a Class Cost of Service Study.

c. Please identify all Decisions the Commission has issued that have accepted a Sum of Individual Max demands cost allocation of distribution transformer and secondary distribution line assets within a Class Cost of Service Study.

Response:

a. While the Company has not performed an exhaustive search on the history of these distribution allocators, they have been used in APS rate cases over the last 12 years, and likely in many rate cases prior to that time.

b. The rate case decisions referenced in part a are:

> Decision No. 69663 (June 28, 2007)
> Decision No. 70667 (December 24, 2008)
> Decision No. 71448 (December 30, 2009)
> Decision No. 73183 (May 24, 2012)
> Decision No. 76295 (August 18, 2017)

c. See APS's response to part b.

Witness: Leland Snook

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Staff 9.14: For the purposes of this question, please refer to the Direct Testimony of Leland R. Snook, page 12, lines 16 through 24, where revenue credits are discussed.

a. Please list all revenue credits included in the Company's Jurisdictional and Class Cost of Service Studies.

b. For each revenue credit listed in response to (a), please identify how the credit is distributed between jurisdictions and between retail customer classes.

c. For each revenue credit listed in response to (a), please identify monetary credit amount from the test year included in the Jurisdictional and Class Cost of Service Studies.

d. For each revenue credit listed in response to (a), please provide historical monthly revenue amounts collected for the years 2015 through 2019, and 2020 to date.

e. Provide all workpapers and source documents supporting the Company's response in electronic form, with all spreadsheet links and formulas intact, source data used, and explain all assumptions and calculations used. To the extent the data requested is not available in the form requested, provide the information in the form that most closely matches what has been requested.

Response:

a. The revenue credits are provided in the spreadsheet attached as ExcelAPS19RC01196.

b. The revenue credits are allocated by direct assignment.

c. Please see the Company's response to part a.

d. Please see the Company's response to part a.

e. Please refer to the Company's response to Staff 9.9.

Witness: Leland Snook

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Staff 9.15: For the purposes of this question, please refer to the Direct Testimony of Leland R. Snook, page 13, lines 19 through 25, where cross-subsidies between customer classes is discussed.

a. Please provide historic ROE for each customer class in the Company's prepared Class Cost of Service Study in each of the Company's two prior rate case filings.

b. Provide all workpapers and source documents supporting the Company's response in electronic form, with all spreadsheet links and formulas intact, source data used, and explain all assumptions and calculations used. To the extent the data requested is not available in the form requested, provide the information in the form that most closely matches what has been requested.

Response: a. Please see the table below.

	TYE 12/31/2010 Docket No. E-01345A-16-0036		TYE 12/31/2015 Docket No. E-01345A-11-0224	
	Present	Proposed	Present	Proposed
Residential	6.08%	6.67%	2.26%	4.57%
General Service	11.86%	12.43%	8.99%	14.74%
Water Pumping	6.06%	6.79%	3.33%	7.35%
Street Lighting	7.19%	7.58%	6.20%	7.22%
Dusk to Dawn	9.76%	10.07%	8.05%	10.09%

b. Please see the attached spreadsheet ExcelAPS19RC01174 for the workpapers for the Cost of Service Study for TYE 12/31/2010. The following workpapers for the Cost of Service Study for TYE 12/31/2015 are also attached:

COSS Model Guide	APS19RC01175
COSS Workbook A	ExcelAPS19RC01199
COSS Workbook B	ExcelAPS19RC01200
COSS Workbook C	ExcelAPS19RC01201

Witness: Leland Snook

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Staff 9.16: For the purposes of this question, please refer to the Direct Testimony of Leland R. Snook, page 18, lines 11 through 16, where it is stated:

No, I am proposing to retain the current base fuel rate of 3.0l68¢/kWh, authorized by the Commission in Decision No. 76295. Recent projections for fuel and purchased power costs anticipate that the average cost in 2020 will remain within 0.05¢/kWh of the current rate, so any change would be very modest. For administrative ease, it would be appropriate to leave the rate as it is currently authorized.

a. Please provide the calculated average cost of fuel and purchased power anticipated for 2020.

b. Please provide a detailed narrative discussing how the Company envisions that differences between the existing base fuel rate established in Decision No. 76295 and actual fuel and purchased power costs will be recovered.

c. Provide all workpapers and source documents supporting the Company's response in electronic form, with all spreadsheet links and formulas intact, source data used, and explain all assumptions and calculations used. To the extent the data requested is not available in the form requested, provide the information in the form that most closely matches what has been requested.

Response:

a. Please see the attached spreadsheet ExcelAPS19RC01176. This information is Confidential and is being provided pursuant to an executed Protective Agreement in this docket.

b. Differences in the existing base fuel rate and actual fuel costs will be recovered through the Company's fuel adjustment mechanism, the Power Supply Adjustment (PSA). Please see the Commission-approved Plan of Administration for the PSA, provided with the Company's Application in this docket and available at the APS 2019 Rate Case Extranet Site, for a discussion of the PSA calculations.

c. Please see the Company's response to part a.

Witness: Leland Snook

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Staff 9.17: Please provide all workpapers used to calculate test year fuel and purchase power costs and the associated pro forma adjustment to bring these expenses down to the Commission's authorized rate established in Decision No. 76295. Provide all workpapers and source documents supporting the Company's response in electronic form, with all spreadsheet links and formulas intact, source data used, and explain all assumptions and calculations used. To the extent the data requested is not available in the form requested, provide the information in the form that most closely matches what has been requested.

Response: The requested information is provided as workpapers LRS-WP5DR and LRS-WP6DR. This information is available on the APS 2019 Rate Case Extranet Site.

Witness: Leland Snook

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Staff 9.18: Please provide all workpapers used to calculate test year production-related chemical costs and the associated pro forma adjustment to bring these expenses down to the Commission's authorized rate established in Decision No. 76295. Provide all workpapers and source documents supporting the Company's response in electronic form, with all spreadsheet links and formulas intact, source data used, and explain all assumptions and calculations used. To the extent the data requested is not available in the form requested, provide the information in the form that most closely matches what has been requested.

Response: The requested information is provided as workpaper LRS-WP7DR and is available on the APS 2019 Rate Case Extranet Site.

Witness: Leland Snook

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Staff 9.19: For the purposes of this question, please refer to the Direct Testimony of Leland R. Snook, page 19, lines 11 through 15, where a pro-forma adjustment to remove prior fuel expenses collected through the PSA is discussed.

a. Please provide an explicit reference to where the referenced revenues related to prior period fuel expenses collected through the PSA is removed from the Company's Jurisdictional and Class Cost of Service Studies.

b. Please provide an explicit reference to where the referenced deferred fuel and amortized deferred SO2 emission allowance sales margins is removed from the Company's Jurisdictional and Class Cost of Service Studies.

c. Provide all workpapers and source documents supporting the Company's response in electronic form, with all spreadsheet links and formulas intact, source data used, and explain all assumptions and calculations used. To the extent the data requested is not available in the form requested, provide the information in the form that most closely matches what has been requested.

Response:

a. Please refer to the Company's cost of service workpapers in LRS-WP11DR, "cost-of-service" tab, row 725.

b. Please refer to the Company's cost of service workpapers in LRS-WP11DR, "cost-of-service" tab, row 1455.

c. Please see workpaper LRS-WP11DR, available at the APS 2019 Rate Case Extranet Site.

Witness: Leland Snook

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Staff 9.20: For the purposes of this question, please refer to the Direct Testimony of Leland R. Snook, page 19, lines 18 through 23, where a pro-forma adjustment to remove PSA fuel deferrals and non-cash mark-to-market accounting entries is discussed.

a. Please provide an explicit reference to where the referenced PSA fuel deferrals and non-cash mark-to-market accounting entries are removed from the Company's Jurisdictional and Class Cost of Service Studies.

b. Provide all workpapers and source documents supporting the Company's response in electronic form, with all spreadsheet links and formulas intact, source data used, and explain all assumptions and calculations used. To the extent the data requested is not available in the form requested, provide the information in the form that most closely matches what has been requested.

Response: a. Please refer to the Company's cost of service workpapers in LRS-WP11DR, "cost-of-service" tab, rows 1399 and 1401.

b. Please see workpaper LRS-WP11DR, available at the APS 2019 Rate Case Extranet Site.

Witness: Leland Snook

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Staff 9.21: For the purposes of this question, please refer to the Direct Testimony of Brad J. Albert, page 16, lines 13 through 23, where he states:

The current RCP rate rider was approved in Decision No. 77421 (Sept. 13, 2019) and applies to customers who submit interconnection requests between October 1, 2019 and August 31, 2020. It is based on four solar projects that went into service during the five-year historical period of 2014 to 2018. Those projects have a Levelized cost of$0.06869/kWh including an adjustment for line losses. According to Decision No. 75859, however, the RCP rate rider cannot be reduced by more than 10% below the previous year's value, which in this case, and in every case since the RCP's inception, is the limiting factor. Since the rate for the 2018 tranche was $0.11610/kwh, and the calculated RCP rate for 2019 has declined by more than 10%, the rate for the 2019 tranche is capped at a 10% reduction, or $0.10450/kWh.

a. Please provide all workpapers used to calculate the estimated 2020 RCP rate, irrespective of Decision No. 75859 restrictions, of $0.06869/kWh.

b. Please provide the historic calculations analogous to (a) for 2018 and 2019.

c. Provide all workpapers and source documents supporting the Company's response in electronic form, with all spreadsheet links and formulas intact, source data used, and explain all assumptions and calculations used. To the extent the data requested is not available in the form requested, provide the information in the form that most closely matches what has been requested.

Response: a. The levelized cost of $0.06869/kWh was calculated using historical weighted average cost for grid-scale solar photovoltaic systems with an in-service date between 2014 and 2018. While preparing these worksheets, APS found an inadvertent error which brings the calculated levelized cost to $0.06850/kWh. A corrected worksheet has been previously provided to Staff. This difference does not affect the currently effective RCP rate of $0.10450/kWh.

Please see the attached spreadsheet ExcelAPS19RC01179 for calculation of the levelized cost of $0.06850/kWh.

Witness: Brad Albert

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Response to Staff 9.21 (continued):

b. Please see the attached spreadsheets ExcelAPS19RC01177 and ExcelAPS19RC01178 for calculations for levelized RCP cost for the historic five-year periods of 2011-2015 and 2013-2017, respectively. These spreadsheets are Highly Confidential and are being provided pursuant to an executed Protective Agreement in this docket.

c. Please see the Company's responses to parts a and b. Please also see the Plan of Administration for the RCP, provided with the Company's Application and available at the APS 2019 Rate Case Extranet Site.

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Staff 9.22: For the purposes of this question, please refer to the Direct Testimony of Brad J. Albert, page 17, lines 9 through 15, where he discusses key principles outlined in Decision No. 75859.

a. Please provide the Company's five-year forecast of avoided costs and energy savings, including all workpapers.

b. Please provide the Company's estimate of ELCC, including all workpapers.

c. Please provide the Company's estimate of line loses at the generation, transmission, and distribution levels, including all workpapers.

d. Provide all workpapers and source documents supporting the Company's response in electronic form, with all spreadsheet links and formulas intact, source data used, and explain all assumptions and calculations used. To the extent the data requested is not available in the form requested, provide the information in the form that most closely matches what has been requested.

Response:

a. Please see ExcelAPS19RC00323 provided in APS's response to RUCO 2.7. This information is Confidential and is being provided pursuant to an executed Protective Agreement in this docket.

b. Please see ExcelAPS19RC00313 provided in APS's response to SEIA 1.14. This information is Confidential and is being provided pursuant to an executed Protective Agreement.

c. Please see ExcelAPS19RC00320 provided in APS's response to SEIA 1.14.

d. APS developed an avoided cost methodology in accordance with the key principles of Decision No. 75859, the framework of which is provided as Attachment BJA-1DR to Mr. Albert's Direct Testimony. This spreadsheet has formulas intact, and is supplemented by the following explanation and workpapers:

- Export % (line 3) - Based on measured rooftop solar generation in the test year. Workpapers and supporting data are provided in the Company's response to SEIA 1.14(a), ExcelAPS19RC00313, "Solar Customer Data" tab. This information is Confidential and is being provided pursuant to an executed Protective Agreement in this docket.

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Response to Staff 9.22 (continued):

- ELCC % (lines 4, 10 and 16) – APS used a top 90 hours proxy methodology to approximate ELCC. Workpapers and supporting data are provided in the Company's response to SEIA 1.14(a), ExcelAPS19RC00313, "Summary" tab. This information is Confidential and is being provided pursuant to an executed Protective Agreement.

- Losses % (lines 6, 12 and 18) – The line loss study is provided in SEIA 1.14(a) as ExcelAPS19RC00320. Rooftop solar exports avoid generation, transmission, and the substation portion of distribution losses. Other distribution losses, such as service drop and service entrance, distribution transformer losses, and distribution feeder line, are still incurred in delivering rooftop solar export from solar customers to non-solar customers.

- Generation Capacity Value Avoided Cost ($/kW-yr) (line 8) – The development of avoided capacity cost is consistent with PURPA methodology and based on the average of three of APS's PPA prices for 2020 through 2022, and the avoided cost of microgrids units in 2023 and 2024. Please see ExcelAPS19RC01191, which is Highly Confidential and is being provided pursuant to a Protective Agreement in this docket. Note that since APS has not identified projects that can avoid transmission or distribution upgrades, avoided transmission and distribution costs (lines 14 and 20) were not provided.

- Avoided Energy Cost $/MWH (line 25) – This cost is based on production cost modeling of the system both with and without solar rooftop export energy, consistent with the PURPA avoided cost methodology. Also please see APS's response to subpart a above for hourly generation, avoided cost values and calculations used in Attachment BJA-1DR. This information is Confidential and is being provided pursuant to an executed Protective Agreement in this docket.

- Metering and Customer Costs (line 27) – Although not included in the calculation at this time, metering and customer costs would reduce the avoided cost of solar export energy. Workpapers for this estimate are provided in the Company's response to SEIA 1.14(h) in spreadsheet ExcelAPS19RC00314.

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Response to Staff 9.22 (continued):

- Natural gas and wholesale market energy prices are important inputs into the avoided energy cost calculation models. Please see APS19RC01191 for prices used in the development of Attachment BJA-1DR. This spreadsheet is Highly Confidential and is being provided pursuant to and executed Protective Agreement in this docket.

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Staff 9.23: For the purposes of this question, please refer to the Direct Testimony of Brad J. Albert, page 18, line 16, where he states that the Company uses a "top 90 hours proxy" to approximate ELCC of solar generation.

a. Please provide a detailed narrative describing why the Company feels the chosen top 90 hour proxy is appropriate to approximate the ELCC of solar generation.

b. Did the Company examine any other methodologies to calculate or approximate ELCC before choosing its selected 90 hour proxy?

c. To the extent the Company's response to (b) is in the affirmative, please list these alternative methodologies considered.

d. Does the Company agree that examination of only the top 90 hours system loads implies consideration of approximately 1.0 percent of hourly generation?

e. Provide all workpapers and source documents supporting the Company's response in electronic form, with all spreadsheet links and formulas intact, source data used, and explain all assumptions and calculations used. To the extent the data requested is not available in the form requested, provide the information in the form that most closely matches what has been requested.

Response:

a. An Effective Load Carrying Capability Analysis (ELCC) is performed to assess reliability of resources using a Loss of Load Probability (LOLP) model. APS performed a reliability analysis for its last IRP filing in 2017. The analysis showed that the loss of load probability is highest, and almost exclusive to, the summer peak period in July and August. Using 90 hours covers most if not all potential summer outages in APS's analysis and thus provides a good representation of a resource's reliability value. ExcelAPS19RC01194 provides the output of this analysis.

b. Although APS believes that ELCC is the most accurate method of determining renewable capacity value, it is complex and time consuming. In its efforts to develop a more efficient methodology, APS evaluated "top hours" methodologies ranging from one hour to hundreds of hours. Based on this evaluation, it was determined that the use of the top 90 hours provided a

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Response to Staff 9.23 (continued):

good, efficient proxy to estimate ELCC of renewable resources. Additionally as part of the 2020 IRP working group, APS retained Energy and Environmental Economics (E3), a consulting firm with wide-ranging expertise in the electric sector, to study how different clean energy policies and strategies impact our ability to maintain reliability and affordability. To facilitate this process, E3 developed a scenario-planning model that provides results consistent with the more detailed models run by APS to create its resource plan. As part of this effort, E3 concluded that a top hours' approach provided a reasonable estimate for a resources reliability value. APS19RC01195 provides a summary of E3's assessment of the ELCC.

c. Please see APS's response to part b above.

d. Yes, hours with a probability of an outage generally range from 0.5%-2% of all hours in a given year. The top 90 hours cover most, if not all, of these hours in a given year.

e. Please see APS's responses to parts a and b above.

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Staff 9.24: For the purposes of this question, please refer to the Direct Testimony of Jessica E. Hobbick, page 2, lines 13 through 20, where she discusses the Company's proposal to recover costs related to the financial impacts of suspending disconnections of service and late fees during summer months.

a. Please provide all workpapers supporting the Company's calculation of the appropriate pro forma adjustment to bad debt expense to account for Commission-ordered changes to APS's residential customer disconnect policy.

b. Provide all workpapers and source documents supporting the Company's response in electronic form, with all spreadsheet links and formulas intact, source data used, and explain all assumptions and calculations used. To the extent the data requested is not available in the form requested, provide the information in the form that most closely matches what has been requested.

Response: a. Please see the attached spreadsheet ExcelAPS19RC01180.

b. Please see the Company's response to part a.

Witness: Jessica Hobbick

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Staff 9.25: For the purposes of this question, please refer to the Direct Testimony of Jessica E. Hobbick, page 5, lines 9 through 20, where she discusses the proposed super off-peak rate for some residential rate schedules.

a. Please provide a detailed narrative explaining how the Company determined the appropriate terms associated with the proposed super off-peak rate.

b. Please provide total TOU-E customer billing determinates for the three-years immediately prior the implementation of the super off-peak feature.

c. Please provide total TOU-E customer billing determinates for the three-years immediately after the implementation of the super off-peak feature.

d. Please provide studies prepared by the Company or on its behalf that examine peak shifting associated with the implementation of the super off-peak feature for TOU-E customers.

e. Provide all workpapers and source documents supporting the Company's response in electronic form, with all spreadsheet links and formulas intact, source data used, and explain all assumptions and calculations used. To the extent the data requested is not available in the form requested, provide the information in the form that most closely matches what has been requested.

Response: a. For the new proposed super-off-peak rates, the Company used the same hours as the existing super-off-peak period, approved by the Commission for rate R-TOU-E, which coincided with the "belly of the duck" hours for winter months.

b. The TOU-E billing determinants for the 2015 Test Year are provided as Attachment ExcelAPS19RC01181. Billing determinants are prepared as part of a rate case proceeding, and therefore are not available for the other years requested.

c. The TOU-E billing determinants for the Test Year ending June 2019 are provided in workpaper JEH_WP1DR, "R-TOU-E" tab. While billing determinants are not prepared for the other years requested, TOU-E usage details are provided for 2017 through 2019 in the attached spreadsheet ExcelAPS19RC01202. Note this report does not include accruals or accounting adjustments that are typically made to billing determinants.

Witness: Jessica Hobbick

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Response to Staff 9.25 (continued):

d. The Company has not yet performed a load shifting study for R-TOU-E but intends to do so in the near future now that the participation has somewhat stabilized. Whether customers have shifted yet or not, APS believes customers should be sent appropriate price signals based on system operations.

e. Please see APS's response to b and c.

Witness: Jessica Hobbick

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Staff 9.26: For the purposes of this question, please refer to the Direct Testimony of Jessica E. Hobbick, page 5, lines 26 to page 6, line 8, where she discusses the proposed subscription rate pilot program.

a. Please provide a detailed narrative explaining how the Company determined that the appropriate term associated with the proposed subscription rate pilot program was two years.

b. Please identify how over-recovers will be handled by the Company.

c. Please identify how under-recovers will be handled by the Company.

d. Provide all workpapers and source documents supporting the Company's response in electronic form, with all spreadsheet links and formulas intact, source data used, and explain all assumptions and calculations used. To the extent the data requested is not available in the form requested, provide the information in the form that most closely matches what has been requested.

Response:

a. The two-year term allows sufficient time to study the usage, revenue, and thermostat management impacts of the program while limiting potential risks.

b. The Company is not proposing any adjustments for variances of monthly revenue under the program compared with the revenue from the customers' otherwise applicable retail rate schedule, other than the normal workings of a Test Year in a rate case.

c. Please see the Company's response to part b.

d. No specific workpapers informed this part of the pilot, please see APS's response to part a. Please also see the Company's response to SEIA 1.10 and SWEEP 1.20.

Witness: Jessica Hobbick

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Staff 9.27: For the purposes of this question, please refer to the Direct Testimony of Jessica E. Hobbick, page 7, line 16, where she mentions that the Company will add a 5 percent adder to the flat bill of the segment of participants without a smart thermostat within the Company's proposed subscription rate pilot program.

a. Please provide a detailed narrative describing how the Company determined that a 5 percent adder was appropriate.

b. Please confirm that customers with a smart thermostat in the proposed pilot can increase their consumption of electricity without increasing their electric bill.

c. Provide all workpapers and source documents supporting the Company's response in electronic form, with all spreadsheet links and formulas intact, source data used, and explain all assumptions and calculations used. To the extent the data requested is not available in the form requested, provide the information in the form that most closely matches what has been requested.

Response: a. Please see the Company's response to SEIA 1.10, part o.

b. Confirm. The subscription rate pilot has a price lock of 2 years, with no true-up at the end for actual costs that differ from the fixed amount over that time. This is appropriate for a pilot where the primary purpose is to study how usage patterns change under fixed pricing.

However, customer still have an incentive to manage energy use because a new subscription rate (if the pilot is extended) would be based on their last 12 moths of usage. Also, to prevent excessive changes in usage, customers whose energy usage substantially changes from historical consumption may be removed from the pilot at the Company's discretion

c. Please see APS's response to SEIA 1.10, SWEEP 1.20, and SWEEP 1.22.

Witness: Jessica Hobbick

ARIZONA CORPORATION COMMISSION STAFF'S NINTH SET OF DATA REQUESTS TO ARIZONA PUBLIC SERVICE COMPANY REGARDING THE APPLICATION TO APPROVE RATE SCHEDULES DESIGNED TO DEVELOP A JUST AND REASONABLE RATE OF RETURN DOCKET NO. E-01345A-19-0236 MARCH 25, 2020

Staff 9.28: For the purposes of this question, please refer to the Direct Testimony of Jessica E. Hobbick, page 12, lines 15 through 24, where she discusses the Company's proposal to credit the transaction fee assessed when paying with a credit card for E-3 and E-4 customers.

a. Please provide a count of E-3 customers by month for the years 2015 through 2019, and 2020 to date.

b. Please provide a count of E-4 customers by month for the years 2015 through 2019, and 2020 to date.

c. Please provide a count of E-3 monthly bills by month that were paid by credit card for the years 2015 through 2019, and 2020 to date.

d. Please provide a count of E-4 monthly bills by month that were paid by credit card for the years 2015 through 2019, and 2020 to date.

e. Please provide monthly transaction fees incurred by the Company associated with credit card payments to E-3 bills for the years 2015 through 2019, and 2020 to date.

f. Please provide monthly transaction fees incurred by the Company associated with credit card payments to E-4 bills for the years 2015 through 2019, and 2020 to date.

g. Provide all workpapers and source documents supporting the Company's response in electronic form, with all spreadsheet links and formulas intact, source data used, and explain all assumptions and calculations used. To the extent the data requested is not available in the form requested, provide the information in the form that most closely matches what has been requested.

Response: a. Please see the table below.

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Response to Staff 9.28 (continued):

Total E-3						
	2015	**2016**	**2017**	**2018**	**2019**	**2020**
January	88,442	84,857	77,895	45,561	46,800	58,130
February	88,321	84,453	73,901	45,124	46,904	58,530
March	88,192	84,250	60,452	45,065	48,769	
April	88,115	83,659	57,613	44,809	49,567	
May	87,971	82,881	54,137	45,514	51,114	
June	87,348	82,372	47,964	45,462	53,284	
July	87,184	82,485	47,273	45,287	54,375	
August	87,029	82,262	46,628	44,851	56,057	
September	87,058	83,441	44,784	45,329	56,820	
October	86,174	83,276	43,972	44,918	58,175	
November	85,535	82,529	44,588	46,448	57,829	
December	85,173	81,033	45,327	46,927	58,229	

b. Please see the table below.

Total E-4						
	2015	**2016**	**2017**	**2018**	**2019**	**2020**
January	1,288	1,348	1,252	859	1,185	1,073
February	1,283	1,325	1,203	863	1,160	1,066
March	1,253	1,296	1,014	880	1,166	
April	1,258	1,287	1,009	866	1,181	
May	1,279	1,253	999	884	1,196	
June	1,276	1,237	998	887	1,208	
July	1,284	1,244	1,001	887	1,233	
August	1,317	1,248	1,025	908	1,265	
September	1,343	1,281	1,047	950	1,290	
October	1,351	1,310	1,058	1,072	1,321	
November	1,364	1,313	1,062	1,095	1,328	
December	1,354	1,291	1,054	1,126	1,175	

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Response to Staff 9.28 (continued):

c. APS is still compiling this data and will provide it as soon as it is available.

d. APS is still compiling this data and will provide it as soon as it is available.

e. E-3 and E-4 customers who elect to pay with a credit card have a $2.95 transaction fee (prior to March 2016,the transaction fee was $3.95) added to their transaction by the third-party payment processor. APS receives the payment amount, absent the transaction fee. As such, APS does not incur any transaction fees for credit card transactions.

f. Please see the Company's response to part e.

g. Please see Attachment APS19RC01190.

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Staff 9.29: For the purposes of this question, please refer to the Direct Testimony of Jessica E. Hobbick, page 14, lines 3 through 10, where she discusses the Company's limited-income discounts compared with other Arizona utilities.

a. Please provide a copy of the referenced survey of Arizona limited-income discounts.

b. Please provide a copy of all studies in the Company is aware of that compare the Company's limited-income discounts to other Investor-Owned Utilities.

c. Provide all workpapers and source documents supporting the Company's response in electronic form, with all spreadsheet links and formulas intact, source data used, and explain all assumptions and calculations used. To the extent the data requested is not available in the form requested, provide the information in the form that most closely matches what has been requested.

Response: a. Please see the attached document APS19RC01182 for a comparison of Arizona limited-income discount programs. For the specific utilities mentioned in Ms. Hobbick's Direct Testimony, please see the following links:

For Tucson Electric Power:
https://www.tep.com/wp-content/uploads/2017/02/101-TRRES.pdf

For Salt River Project:
https://www.srpnet.com/prices/pdfx/April2015/EconomyDiscountRider.pdf

b. The only information APS is aware of is provided in the Company's response to part a.

c. Please see the Company's response to part a.

Witness: Jessica Hobbick